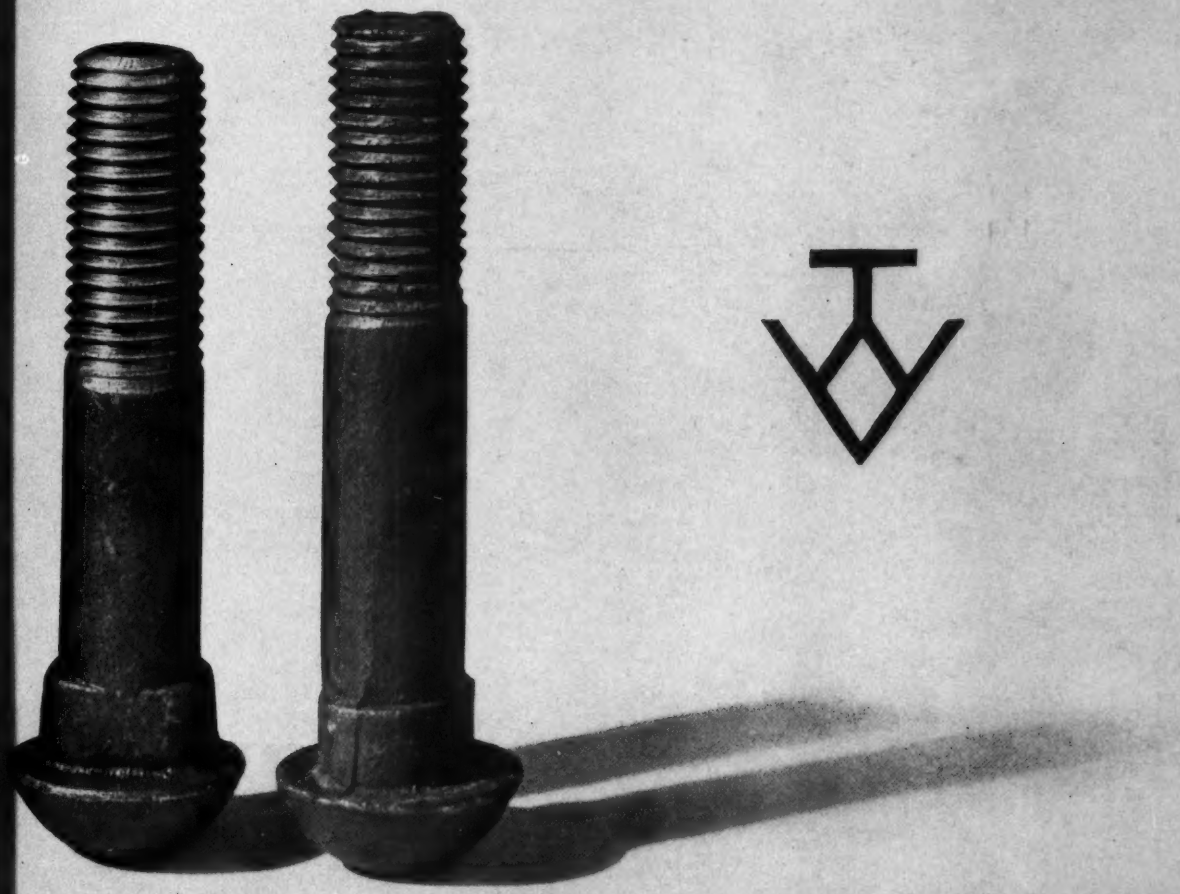
Railway Maintenance Engineer

Volume 18 CHICAGO—MARCH, 1922—NEW YORK Number 3



RAILWAY MAINTENANCE ENGINEER
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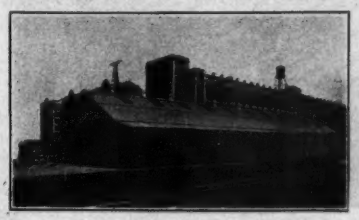

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Maintenance of Way Buyers' Guide

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Torches, Blow Combination.
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Torches, Welding and Cutting.
Air Reduction Co., Inc.

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Weir Frog Co.

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Ruberoid Co., The.

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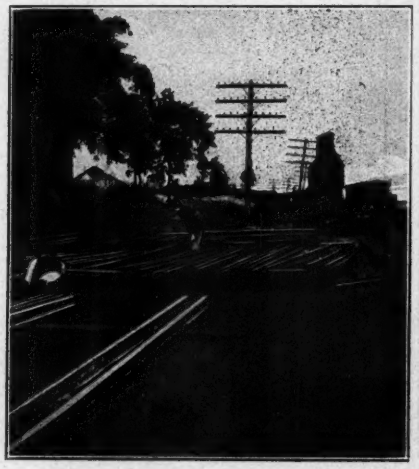

has many distinctive features which make it the favorite. The bender has an unusually large working radius and allows you to bend rail within ten inches of the end, without requiring another section of rail and splice bars.

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Railway Maintenance Engineer

Vol. 19 March, 1922 Number 3

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Why requisitions are not always filled on time?
Why old ties are burned?
A new way to clean ballast?
How to renew a turntable?
How to clean sand out of wells?

Answers to these and other practical questions will be found elsewhere in this issue.

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(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age* and *Railway Engineering and Maintenance of Way.*)

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WE GUARANTEE, that of this issue, 7,300 copies were printed; that of these 7,300 copies, 5,767 were mailed to regular paid subscribers, 65 were mailed to advertisers, 27 were mailed to employees and correspondents, and 1,541 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 21,200, an average of 7,066 copies a month.

Railway Maintenance Engineer is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulation (A. B. C.)

What More Could You Ask of a Shovel!

Here is one of the many examples of the exceptional service given by Wood's Mo-*lyb*-den-um Shovels.

Monterrey, N. L.
January 7th, 1922.

The Wood Shovel & Tool Company
Piqua, Ohio.

Gentlemen:—

For the past year we have been using several of your "Mo-*lyb*-den-um" square point shovels in our warehouse for unloading and handling sand, gravel, broken stone, steel borings and turnings, and for general excavation. We are pleased to report that to date these shovels do not show enough wear to give us a basis for computating their probable life.

These "Mo-*lyb*-den-um" shovels were used along with a very high quality carbon steel, and the carbon steel shovels have worn during a year to such an extent as to make them practically unfit for further service, while the "Mo-*lyb*-den-um" are as good as new and are the favorites of the workmen.

There is a wall in front of the store-house of very hard, dense concrete with blue limestone aggregate and we have about spoiled its appearance by chipping large pieces out of the top with the corners of the "Mo-*lyb*-den-um" shovels. We have allowed several of our local "strong men" to try to break or bend the shovels in this manner and have never been able to find even a mark on the shovel where it came in contact with the concrete. A very mild blow is sufficient to bend back the corner of the crucible steel shovel such as we have been using in the past.

We wish to state that in view of our satisfactory experience with your shovels which we have tested, we shall confine our purchases to "Mo-*lyb*-den-um" shovels.

With best wishes for your success, we are,

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Supply Department
By H. C. Sovereign, Pur. Agt.

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Wood's Mo-lyb-den-um Shovels

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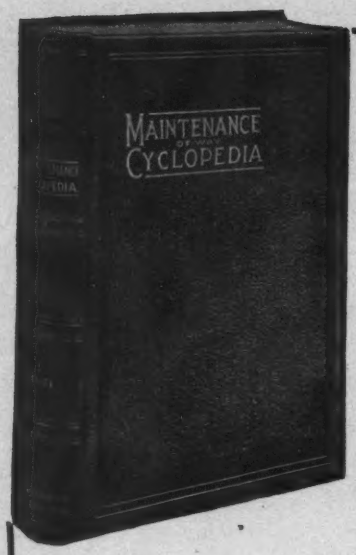

INCREASE YOUR MAINTENANCE KNOWLEDGE

A Firm Foundation for the Present
A "Stepping-Stone" for the Future

Authoritative Information

for

Every Man

in the

Maintenance Dept.

See for Yourself

at

Our Expense

Maintenance of Way Cyclopedia is Divided into Eight Sections as Follows:

1. **Track Section—210 Pages.**
   Track laying methods and appliances as well as those used in maintenance work are described and defined. Hundreds of drawings, photos and sixteen large folding plates showing switch layouts, etc., are included.
2. **Bridge Section—77 Pages.**
   Types of bridges and methods used in their construction are described and illustrated. A. R. E. A. specifications for bridge design and erection are given.
3. **Building Section—74 Pages.**
   Various types of railway buildings—passenger stations—coaling stations—engine and freight houses, etc., are described and illustrated by photographs of actual buildings and drawings.
4. **Water Service Section—47 Pages.**
   Appliances and tools needed for water service work are described and pictured in a comprehensive manner.
5. **Signal Section—120 Pages.**
   Principles and apparatus used in modern railway signaling are covered. Signal systems are illustrated in detail.
6. **Wood Preservation Section—24 Pages.**
   Treats the subject fully including a key for the identification of woods as well as specifications for different preservative treatments.
7. **General Section—77 Pages.**
   Information regarding construction and camp equipment as well as a large number of tools and devices which are used in more than one of the foregoing sections is given.
8. **Catalog Section—240 Pages.**
   Describes in a specific manner various machines and appliances used in maintenance work and where they may be obtained.

All the subjects treated in the several sections are listed alphabetically in a **General Index**. The **Catalog Section** contains in addition to the alphabetical **Trade Name** and **Classified Indexes**, detailed descriptions of products you are interested in.

Pres. Underwood of the Erie Railroad Says:

"The Maintenance of Way Department * * * requires at its head great engineering skill in its various operations. The employees who do the skilled and unskilled labor under the direction of these department heads are always in line for promotion, especially when they are loyal and equipped with technical knowledge."

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Railway Maintenance Engineer

Get Good Painters

Few phases of maintenance of way work during the past year were neglected so grievously as painting. This is to be regretted for two reasons: (1) Deferred painting always costs more than painting done in proper season, and (2) the abandonment of painting schedules serves to disorganize the painting forces. Painting is a trade and the high grade work to be done by the experienced and thoroughly trained painter is not to be expected of the casual employee, even if he deserves the appellation of "handy-man." It requires training to learn the painter's trade, which includes not only the wielding of the brush, but also the mixing of the paint, the judging of consistency, the care of the tools and equipment and many other details. Moreover, it is only one who follows the trade because he likes it who will take enough interest in the work to do it properly. Owing to the uncertainty of railway employment for painters in recent years it has been difficult to obtain and hold good men. The organization of painting crews for the coming season is one of the big responsibilities of the painter foreman and his superiors.

Watch the Super-elevation of Curves

Few problems require closer attention from the supervisor and cause more concern on the part of the foreman than the maintenance of the proper super-elevation on curves. Volumes have been written on this subject and its principles are familiar to every track man. However, in spite of all of the rules which have been prepared much of the success achieved in the maintenance of curves comes from the exercise of mature judgment by the man on the ground who must determine the relative weights to give to the speeds in passenger and freight service to secure smooth riding for the one without undue rail wear from the other. On the one hand he is confronted with the fact that the insufficient or irregular elevation of the outer rail detracts from the comfort of passenger travel, while, on the other hand, excessive elevation results in greatly increased rail wear and cost of maintenance. After he has once determined the proper elevation for the outer rail on a curve and the track has been raised accordingly, he must see that it is maintained to that standard, for the destructive action of traffic is much more marked on curves than on tangents. A foreman should determine the riding qualities of the curves on his section by going over them at frequent intervals on high speed trains. He should also watch closely the action of the track under this traffic to see wherein he can modify his super-elevation to secure the desired results.

Progress in Autogenous Welding

No development relating to the repair of track work has attracted greater attention in recent years than that of autogenous welding, namely, the building up of metal parts by the adding of new metal in the molten state through the aid of the oxy-acetylene flame or the electric arc. For a number of years this process has been applied with success to the repair of carbon steel frogs and more recently to the building up of the battered ends of rail, and with the success attained in these applications it is but natural that maintenance of way officers would turn to this process as a possible means of increasing the life of manganese steel frogs and crossings. Until recently efforts in this direction have met with repeated failures, but during the past year the electric arc has been applied to the repair of manganese steel crossings with results showing greater promise. Parts broken out of the crossings have been replaced with new metal with a fair degree of permanence and although the success of this method is not yet definitely assured, there is reason to believe that continued experimentation will now make it so.

Take an Interest in the Business

The careers of maintenance of way men, whose sterling worth and unceasing effort have received recognition through their selection for the highest positions attainable in railway service, afford much food for thought. One trait which seems to have been developed in all of these men is their ability to assume control over branches of the service in which they have had no direct training. The explanation for this is that they have always made it a point to learn all they could about the work of the other departments. In other words, they have taken a live interest in what was going on around them. In a measure this knowledge of other departments is necessary for the proper execution of one's work. As stated by President Pearson of the New York, New Haven & Hartford elsewhere in this issue, "It is one thing to change out a rail, but it is another to do it without holding up traffic." But the reason goes deeper than this. The man who wants to progress must ever increase his knowledge of railroading as a whole. There is, however, still another side to the interest which a man should have in the company which employs him. This relates to its affairs as a business concern. He should make it a point to know whether business is picking up or falling off, what character of traffic predominates, how the earnings stand, etc. Information on many of these points is to be had by watching train movements, by talking with other officers and employees, by questioning superiors when opportunity affords. The reward for an active interest along this line is twofold; it brings a knowledge that will prove valuable and it engenders a habit of mind that is sure to be of lasting benefit.

An Organization to Maintain Equipment

In the past the amount of mechanical equipment which the maintenance of way department has used was not sufficient to warrant the development of a special organization to keep it in repair. As a result it was the general practice to turn such work over to the mechanical department to handle as occasion demanded. This practice, with its division of authority, was unsatisfactory from several angles. More recently the amount of equipment used in maintenance of way work has increased and with it the amount of repair work. The adoption of the motor car, the tie tamper and similar equipment in large numbers as well as the more general use of spreaders, ditchers, steam shovels, etc., has increased the amount of repair

work to the point where many roads are justified in creating a special force to concentrate on it, particularly if to this is added the repair of the smaller tools. By concentrating the repair of equipment and tools in the department responsible for their use, better results will be secured, while defective work or uneconomical practices can be detected and corrected at once. Men can be trained for this special work and kept at it, thereby becoming more proficient. Control of all repair work in the one department will enable it to be so scheduled as to give preference to that most urgent. At this season of the year when this equipment is entering on the active period of service and when delays awaiting repairs are most serious, careful consideration may well be given to the most economical and efficient methods of maintenance.

BE SURE YOU'RE RIGHT, THEN GO AHEAD

THE INGENIOUS method of replacing a turntable, described on another page of this issue, is a striking example of the complicated structural problems encountered in railway work. It involves a definite sequence of events carefully arranged so that they may be completed in the shortest possible time. The essential requisite of such operations is a careful planning in advance, coupled with experience and judgment which will insure the officer in charge that each step can be carried out exactly as planned.

Lack of confidence in the plan is fatal. As a case in point the renewal of a certain turntable on another road had been carried to a point where the new table was in place and required but the removal of the old circle wall to clear space for turning it. A battering ram was being used for this purpose, a rather slow though steady process, but the progress made was not rapid enough to suit the mechanical officers, especially the superintendent of motive power who happened to be present. The bridge and building officer in charge permitted himself to be influenced by the insistent demands of this superior officer of the other department, and made arrangments to use dynamite to break down the old wall, but by the time the explosive was procured the work had been finished according to the original schedule, although not as quickly, perhaps, as if the officer in charge had given the work his undivided attention all the time that it was in progress.

There is reason to believe that the work might have been done more effectively with the explosive or that less delay would have been involved if it had been carried out according to the plan used at Denver, where the old wall was taken out in advance of the turntable change. But whatever the plan, the man in charge should work it out so carefully that he is thoroughly convinced of the practicability of every detail and then should not allow himself to be stampeded into changing his plan while the work is in progress. Emergency work necessarily calls for quick decisions or sudden changes in plans on the spur of the moment, but these have no place when opportunity is afforded for the preparation of a thoroughly considered plan before the work is undertaken.

THE SPARK PLUG

A spark plug is a small thing. A railroad can buy two of them for less than a dollar. Yet one road found that it had spent over $16,700 for spark plugs in the last four years. It found further that the average length of service of these plugs was less than three months. At the same time attention was called to a foreman who had used the same plugs on his motor car for over 15 months and they were still in good condition. If every user of spark plugs had secured only one-half the service obtained by this foreman the saving on this one road would have amounted to over $10,000. Extended over the railways of the United States and Canada, it would have been over $500,000, a sum sufficient to buy over 12,000 tons of rails or over half a million ties. Truly the spark plug, like many other items of material used in maintenance of way work, is a small thing, but the possibilties for economies in its use are large in the aggregate.

WHILE IT IS FRESH IN THE MIND

THOSE who have at some time in their careers entered upon surveys or engineering work involving the use of the notebook for record purposes know that one of the lessons learned, whether by instruction or from a series of unfortunate experiences, has been the making of all notations while on the site of the work, not after the work is left many miles behind. In this practice, indeed, lies one of the distinctly important rules of the engineer. But it is not a rule of value to engineers only. Without question it is a rule which in its entirety could be often used to advantage in other lines of railway maintenance activity and certainly, to the extent of it being a rule of making a record while the mind is fresh, it has a very present application.

Generally speaking, it may be said that the country is still in the grip of winter. Some roads, in fact, are even now experiencing their most severe storms. In any event, maintenance men have freshly in mind the troubles encountered as a result of winter, have doubtless observed that many afford the possibility or certainty of corrective treatment, and have even gone so far as to outline in their minds what that corrective treatment in each case should be. Such observations having been made, then, it may well be asked if they will continue merely as observations, dwindling in value as the memory of them becomes less distinct and the conditions of later seasons momentarily demand attention, or if each man, looking ahead to another winter, will make his notes and organize his plans while the conditions are about him and his mind is fresh. This is a question which all maintenance men should now be thinking about. To pursue the latter course is like striking the anvil while the iron is hot.

CROSSING BOLTS AND BOLTING

TRACK FOREMEN and supervisors can well afford to read carefully the paper on the maintenance of crossings published elsewhere in this issue and particularly that portion relating to bolts and bolting. No single factor affects the life of a crossing more than the maintenance of the bolts. If kept tight they force the crossing to act as a unit under load, while if they are allowed to become loose under the vibration of the passing wheels each section in turn carries the load and the deterioration increases rapidly.

With good construction (and most crossings are better built than maintained) the problem is one of overcoming the deterioration as it develops in service. The day to day tightening of the bolts and the remedying of other defects will go far to arrest the deterioration which, if allowed to continue, will cause the crossing to go to pieces with increasing rapidity. Also when it becomes necessary

to renew the bolts they should be replaced with others of not only the same size so as to fill the holes, but of as good quality as well.

It is the practice to require crossing manufacturers to furnish heat-treated bolts of high quality and then to renew them when necessary with any bolts which happen to be of the right size without regard to quality. The inconsistency of this should be self-evident, for if special strength is necessary in the bolts in a new crossing, it is even more important in one that has become worn and in which the tendency to vibration is accentuated. Foremen and supervisors should see that they keep in stock bolts of the same quality as those furnished with the crossing originally and that they are applied as renewals are required.

THINGS ARE LOOKING BETTER

CONCRETE evidence of an improvement in the railway situation is presented daily. Contrary to the experience of last year, car loadings have increased steadily since the holidays until they are now not only 15 per cent above those of the same period in 1921, but are also in excess of those for the same weeks in 1920. These loadings are being reflected, of course, in the gross earnings of the roads and in turn in their expenditures. Thus in the first six weeks of this year the railways of the United States purchased three-fourths as many freight cars as were ordered in the entire year of 1921, while in the four months since November 1, 1921, 65 per cent *more* freight cars were ordered than in the entire 10 preceding months. Likewise, in the first six weeks of this year 50 per cent more passenger cars were ordered than in the entire preceding year.

The outlook in the engineering and maintenance of way field is equally promising. While materials for roadway and structures have not been ordered as rapidly as in the equipment field because of seasonal influences, the outlook presents a marked improvement over that of the last two or three years. As an index of this activity the construction news published in the January, February and March issues required four columns each or more than in any issue during all of 1921. While a considerable number of these items appearing in the February issue referred to projects of small or moderate size, it is significant that over 400 miles of new lines were recorded in the one issue, involving an expenditure of over $12,000,000, while over 35 other projects were enumerated with an aggregate expenditure of over $16,000,000. A similar condition will be found by a perusal of the construction news columns in this issue.

Referring to specific roads, the Santa Fe has announced that it has authorized the expenditure of $43,150,000 for improvements and additions to its facilities, of which $11,750,000 will go for the completion of work undertaken and suspended last year and $22,000,000 for new work. The Chicago, Burlington & Quincy has set aside approximately $15,000,000 for new construction and additions to roadway, while the Great Northern has appropriated over $7,000,000 for similar work. Contracts have already been let for over 200 miles of second track in the middle west, while several large terminal projects have been definitely authorized or are in immediate prospect.

While this work is as yet concentrated to a considerable extent on the more prosperous roads this is always the case after a business depression and past experience indicates that it will spread to other roads, for the need for additional facilities is universal and the resumption of work is dependent only upon the ability of the roads to place their finances in good order.

Letters to the Editor

WHY NOT SHORTEN THE CLAW BAR?

Greensburg, Pa.

TO THE EDITOR:

I notice a comment regarding spike heads and claw bars in the January issue. It is true that men often have their hands injured by the claw bar dropping on the opposite rail when they are pulling inside spikes. There is another serious annoyance in connection with the use of claw bars; that in where tracks are insulated where the bars will drop on the opposite rail and throw the signals to stop if great care is not exercised. In order to overcome all of the above troubles why not reduce the length of the claw bar from 5 ft. to 4 ft. 6 in., which will eliminate the danger of its striking the opposite rail while it will serve every intended purpose just as well?

E. H. SEEMAN,
Foreman, Pennsylvania System.

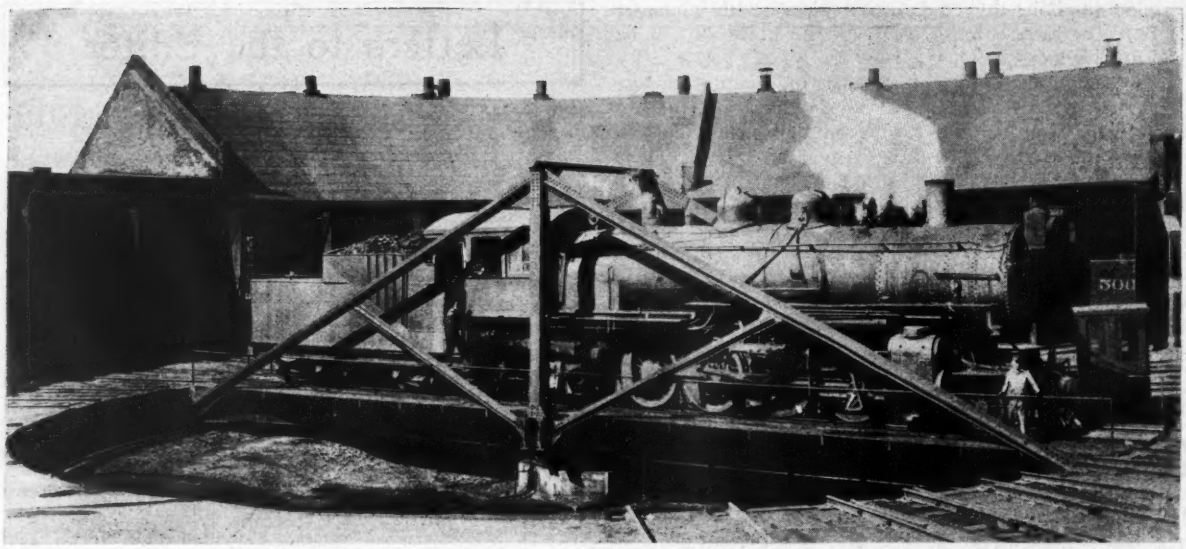
NEW BOOKS

The Design of Steel Mill Buildings. By Milo S. Ketchum, director of the department and professor of civil engineering, University of Pennsylvania. 6½ in. by 9 in., 632 pages, 410 illustrations. Flexible binding. Published by the McGraw-Hill Book Company, New York.

This book is the fourth edition and has been rewritten and enlarged. The text covers the calculation of the stresses in framed structures and also the design of buildings having a self-supporting steel frame with a light covering, usually fireproof. The scope of the book has been increased in this latest edition by the addition of a discussion of the calculation of the stresses in statically indeterminate trusses and frames, several problems in framed structures, and detailed designs of a crane girder, a roof truss and a steel frame mill building.

Kidder's Architects' and Builders' Handbook. Thomas Nolan, editor-in-chief, professor of architectural construction, University of Pennsylvania, Philadelphia, Pa. 1,907 pages. Illustrated. 4½ in. by 7 in. Bound in flexible leather. Published by John Wiley & Sons, Inc., New York.

This is the seventeenth edition of the handbook published under the same name for many years by the late Frank E. Kidder. As in the previous edition, this volume constitutes a compilation of practical and scientific information used in the design and construction of buildings of all kinds. By far the larger part of the book is devoted to structural design of buildings of wood, steel, concrete and masonry, but Part III is devoted to the auxiliary problems of the builder, namely, heating, ventilating, lighting, etc., together with other miscellaneous information required by the architect and builder, including matter concerning the registration of architects and standard documents of the American Institute of Architects. The first portion of the book is divided into two parts. Part 1 of 121 pages is devoted to practical mathematics and Part II of 1,100 pages is devoted to the design and construction of buildings. The modifications and additions in this edition are introduced for the purpose of bringing the volume up-to-date. Chapters on fireproofing and reinforced concrete construction have been rewritten and a great deal of new information has been introduced on graphical methods of design, data on gages, wire and chains, secondary stresses and flat slab construction. In Part III the matter on heating and ventilating has been revised and a chapter on chimneys has been added. The book is well illustrated with line drawings.



The New Table in Use.

Novel Methods Feature Turntable Renewal

Explosives Used to Take Out Old Circle Wall, New Structure Hauled in With the Aid of Locomotive

By R. G. AYLSWORTH
Resident Engineer, Chicago, Burlington & Quincy, Denver, Colo.

AMONG THE improvements made at the engine terminal of the Chicago, Burlington & Quincy at Denver, Colo., in 1920-21 was the replacement of a 70-ft. deck turntable serving a 20-stall roundhouse with a through table 85 ft. long, in the same location. The old table was of the conventional type, with a pair of girders mounted on a roller bearing center, propelled by an air motor tractor. The new table comprises through trusses as indicated in the photograph, is mounted on a bronze lens bearing and is operated in the same manner as the old table. As 60 engines are normally handled each day at the roundhouse and the change of tables was made in the winter, it was important that the work which interfered with the use of the table be done as expeditiously as practicable.

The work fell into two parts, (1) the preparation of the pit for the new table, which was carried out without interruption of traffic, and (2) the removal of the old table and the installation of the new. By reference to the drawings it will be noted that the construction of the new curb, which is built of creosoted fir blocks dowelled together on a concrete footing, as well as other preliminary operations, was facilitated greatly by the fact that the greater length and the lesser depth of the new table permitted most of the remodeling of the pit and foundation to be done without affecting the operation of the table.

Building the New Circle Wall

The new curb was built to full height in sections of various lengths determined by the position and importance of the radial tracks. Excavation was started at a point not occupied by tracks and not more than four roundhouse tracks were taken out of service at one time. The soil was firm enough to stand without bracing. The entire section back of the old curb required for the enlargement of the pit and the new curb footing and wall, that is, an annular space 7.5 ft. wide and 7 ft. deep, was excavated with pick and shovel and the waste was loaded by wheelbarrows into a gondola car set in one of the stalls which was out of service on account of the work in progress. The footing was poured at once, the upper surface being finished to accurate grade. Dowels were set by templet from reference points located at intervals of 10 ft., 50 ft. from the center of the pit. As soon as the concrete was firm a section of the wooden curb was completed and the radial tracks between the two curbs were supported by cribs built of sawed track ties and bridge timbers. The hole was covered with planks for the safety of employees.

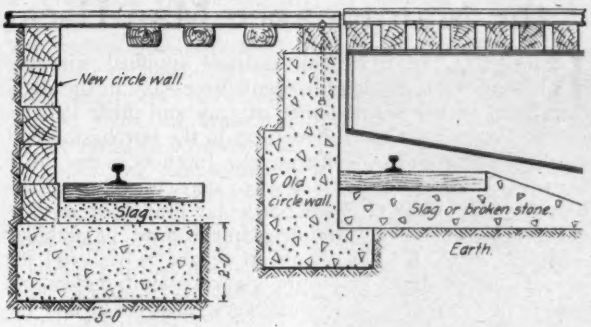
A typical cycle of this operation illustrates the method. On November 8, 1920, Tracks 15 and 16 were taken out of service and the excavation under these tracks completed. The following day the concrete footing under these tracks was poured, the two adjacent Tracks 17 and 18 were taken out of service and the excavation made. On the third day the curb was completed under Tracks 15 and 16, the cribbing built and these two tracks restored to service. Also on the third day the footing under Tracks 17 and 18 was poured and the group of tracks in advance of 17 and 18 was taken out of service and excavation made. In this manner the entire curb was finished and all tracks carried on cribbing.

The old center foundation was square in plan, the size being reduced from the base upward by rectangular offsets, the base being considered ample in size to transmit the load of the new table. It was a simple matter to enlarge the top of the foundation to the dimensions required, but it was necessary to raise the top of the foundation 1 ft. 11½ in. To avoid the delay necessary for the setting of concrete poured after the old table had been removed, a reinforced slab was constructed at a convenient place several weeks in advance and protected from cold until thoroughly cured. Lifting stirrups were

embedded in the slab to facilitate handling with a derrick and the complete center bearing was mounted permanently on the slab.

"Shooting" the Old Wall

After the completion of the new curb the old concrete wall above the footing was removed. The concrete proved to be of excellent strength and blasting was resorted to with very satisfactory results. The wall was 2 ft. thick for a height of 2 ft. 6 in. above the footing and it was necessary to remove about 4 ft. of its height. The ends of the circle rail ties which were in contact with the wall were chopped off to prevent deformation of the rail during blasting operations. Holes were drilled 18 in. deep with a rock drill driven by compressed air from the roundhouse compressor. These holes were located about 4½



The Old and New Circle Walls

ft. below the base of rail at horizontal intervals of 2½ to 3 ft. They were pitched downward at a small angle with the horizontal for convenience in drilling and for the most favorable direction in applying the disruptive force. The charge, which consisted of one stick of 40 per cent Red Cross dynamite 8 in. long, with a diameter of 1¼ in., was thus at the center of the mass horizontally. All of the drilling was done before the blasting was started. The shots were fired with a blasting machine.

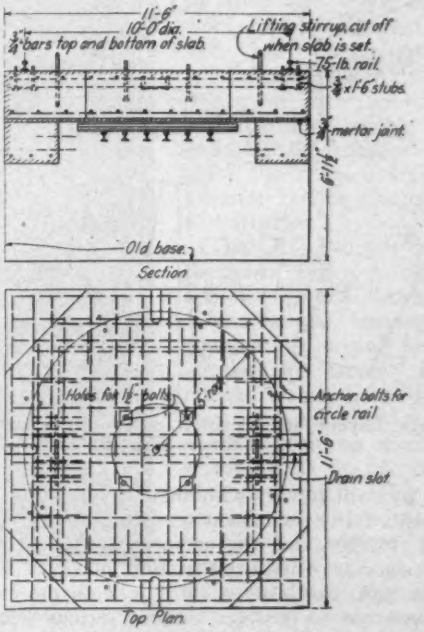
A manhole in the wall located at a point where there were no tracks above offered a convenient place for breaking open the circle, and from this point the wall was broken up and taken out in longitudinal sections in lengths determined by convenience of removing the muck and the feasibility of taking the roundhouse tracks out of service. Protection against flying pieces of concrete was insured at first by the use of two timber blankets 8 in. thick and 10 ft. square, one of which was laid on top of the wall and the other leaned against it on the inner side. It developed as the work progressed, however, that this protection was not necessary.

The concrete was broken into pieces of all sizes up to 40 cu. ft. in volume, which were loaded directly into cars with a clamshell bucket and locomotive crane, working from the table. As soon as a section of the wall was removed the cribbing under the radial tracks was adjusted and a temporary wooden curb laid to carry the ends of the rails left unsupported. An average of 30 ft. of wall was removed daily. Five roundhouse stalls were cut off at a time for this work. However, the entire work of blasting one section of wall, removing the broken concrete and building the temporary curb was accomplished within the 8 hours of a single shift and the stalls were available for use the other 16 hours of the day.

The new table was erected on a radial track which was in line with one of the roundhouse stall tracks. The lower chords were set on transverse square timbers bearing directly on the rails of the track and carefully adjusted with the aid of an engineer's level so that the upper surfaces were in a plane. After complete erection the entire table was painted and the track installed upon it ready for use. The rails were effectually anchored against longitudinal movement. This completed the preliminary stage of the work.

Changing the Tables

January 24 was selected for making the change. Some snow fell on the night before, but the temperature was favorable. Engines which could not be detained were removed from the roundhouse before the beginning of the day shift, a switch engine under steam being left in the stall which lined with the track on which the new table was standing ready for launching. At 8 a. m. the old table was turned over to the construction forces. After the operator's cab had been disconnected and removed, the table was turned so as to be at right angles to one of the approach tracks which was extended at once well out toward the center of the pit on a cribbing of large timbers with extended base. A wrecking derrick was pushed out on this track so that its hook at short radius hung over the middle of the table, where a hitch was taken around the transverse loading beams over the center bearing. The table, which weighed 35 tons, was then lifted clear of the approach track and the wrecker with table suspended was withdrawn to a convenient point to dispose of its load temporarily. The center bearing was re-



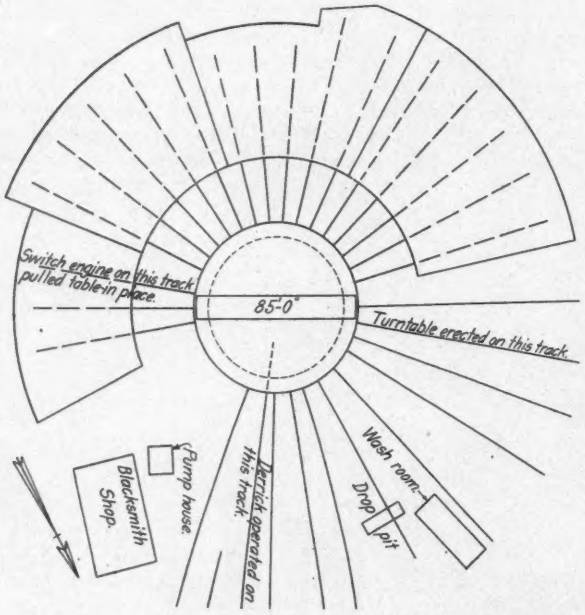
How the Old Center Bearing Was Enlarged

moved, the anchor bolts cut off and a thin mortar bed spread on the top of the old foundation. The foundation slab, which had been subjected to a steam bath long enough to become thoroughly warmed so as to prevent freezing the mortar joint, was then picked up with the derrick, moved out to the middle of the pit, oriented, and set on the reconstructed foundation to exact location and elevation. Intersecting strings from reference points set in the pit after the old table had been removed made it easy for the superintendent and foreman to see the exact point to which they were working, at any stage.

In the meantime, as soon as the use of the table was discontinued a force commenced to remove the cribbing under the radial tracks and the temporary curb, as well as the cribbing and extension of the approach track on which the derrick had been operated. This was followed

immediately by another gang which constructed the new circle rail, bringing it to line and grade on slag ballast. Simultaneously with this work the rails of all tracks entering the table were cut off to proper lengths with an oxy-acetylene torch. The old table was entirely out of the way at 11 a. m. and the slab in place at noon.

When the pit had been cleared, the radial track on which the new table was standing was extended nearly across the pit on light timber cribbing, care being given to secure strong joints. The rails were liberally greased. A hitch was taken on the forward end of the new table with a 1½-in. steel cable; the locomotive in the stall opposite was run out to the edge of the pit and the cable attached ready for the first haul (to be accomplished by backing the engine into the stall). Some difficulty was encountered in making the start. The table complete with track weighed 53 tons and this load was transmitted to the track rails at four points by 12-in. timbers shod on



Track Layout and Position of the Equipment When the Change Was Made

the forward corners with angle bars. These bearings had taken a fairly permanent set during the period of erection and, furthermore, the surfaces in contact were without lubrication. The initial friction, however, was overcome with jacks and after a short jerk on the cable the table moved out to position without serious delay. Five or six trips of the locomotive were necessary because the track into the house was too short for less.

At 3 p. m. the table reached a position above its permanent location. The load was then transferred to four 50-ton jacks, one at each corner of the table, the track and cribbing were removed and the table lowered to its final position on the center bearing. Very little lateral or longitudinal movement was required after the locomotive was released. As soon as the tractor was lowered into position and connected and oil pumped into the center bearing the new table was put into service. The limits of the eight-hour working day were carefully respected, so that this second stage of the job extended well into the second day. Twelve working hours elapsed from the time the old table was turned over to the construction forces until the new table was put into operation.

It will be noted that the use of machinery for handling all heavy loads expedited and reduced the cost of the work as compared with other methods. The breaking up of the old concrete curb by blasting was under perfect control and proved an entirely satisfactory solution of a problem somewhat difficult by reason of the requirements of safety and economy in a busy place and the necessity of preserving a maximum use of the roundhouse facilities during the period of construction. The plans for this work were prepared under the direction of F. T. Darrow, assistant chief engineer, Lincoln, Neb., and G. A. Haggander, bridge engineer, Chicago, and the field work was carried on under the supervision of W. S. Perry, supervisor of bridges, Chicago, Burlington & Quincy, Lines West, Lincoln, Neb.

Getting the Supplies Which the Maintenance Man Uses*

KEEPING an 8,000-mile railroad supplied with the forty thousand various items necessary in the daily operations of the maintenance of way and other departments is no small task and requires in the purchasing and stores departments as well trained a force as in any other branch of railroading. While each department using the material is familiar with its particular branch of service, the purchasing and stores department must be familiar with the entire road, not only in regard to its need for supplies but with respect to the market conditions, values, length of time to allow for delivery, inspection, and for the care and proper distribution of the equipment.

To serve the Rock Island property requires a wide distribution of the many items involved, considering that 14 states are traversed. To handle this successfully, it is necessary to have 42 storehouses, consisting of 1 general store, 3 district or distributing stores, 16 division and 22 local stores.

To show the volume of requests made on these 42 stores daily, for material, the following figures are given:

8,500 material cards, total items	25,500
750 requisitions, total items	4,500
Total items furnished daily	30,000

To accomplish this task, that is, to get this material from the manufacturers and shops, to question wrong-ordering reference, to handle inspection, to give advice as to shipments, and check up on surplus material, scrap, obsolete material, reclamation work and transportation from points not needing to points requiring urgent delivery, requires an average daily of 500 telegrams and 2,000 letters and mailgrams.

The value of the material handled in and out of the 42 stores, in 1920, was $70,067,297. To get this material for all departments, required 25,000 requisitions, placed with the purchasing department, covering 200,000 separate items, specified in required quantities.

As indicated above, the stores department, in addition to handling the new material, must also finally dispose of the road's accumulation of scrap, and to indicate the amount of work in connection with this, the stores department handled and disposed of, in the year 1920, a total of 123,926,620 pounds of scrap, valued at $2,038,-211.60. During 1920, the department, at the general scrap dock at Silvis, received 59,376 tons of scrap, and shipped out on sales orders, 44,506 tons. The total tons handled were 103,882. From this scrap was reclaimed $360,398.91 of usable material, or $6.07 from every ton.

At present-day prices, it is necessary for this company to carry on hand approximately $10,000,000 in materials and supplies.

*From an article by C. H. Rost, general storekeeper, Chicago, Rock Island & Pacific, published in the Rock Island Magazine for February, 1922.

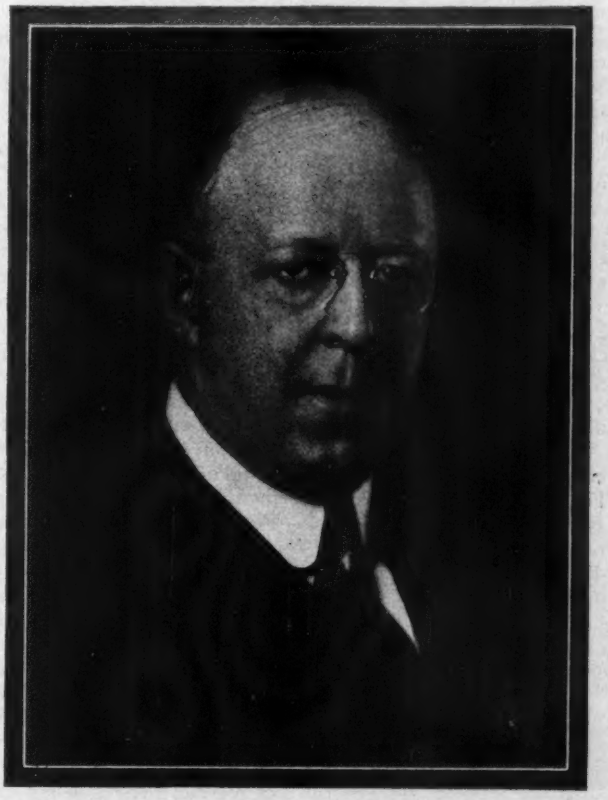
Are You Getting an Intimate Knowledge of the Practical Details?

"Education Affords a Running Start," Says President Pearson, "But Dependence on that Alone Is Not Sufficient."

By WALTER S. LACHER

IS A COLLEGE education necessary for thorough success in the railway field? Edward J. Pearson, president of the New York, New Haven & Hartford, says it is not. "While education aids largely toward earlier advancement in railway service, as it does in all lines of life, it is not necessarily the essential measure, as is evidenced by the majority of railroad officers who through ability, hard work, persistence, good character and their proficiency as human engineers have advanced from all branches of the ranks to positions of authority or importance. It must not be overlooked, however, that some positions demand technical training and that in numerous instances, positions which are thus opened to the officer prove to be stepping stones toward more rapid advancement."

Mr. Pearson is himself a graduate of Cornell and is by no means inclined to deprecate the value of a technical education, but he sounds a note of warning to the young man fresh out of school. "Education affords a running start, but dependence on that alone is not sufficient. There must be intimate knowledge of practical details, commencing at the bottom. The college graduate fails unless he realizes the importance of the practical side of railroading and learns it from the ground up."



Edward J. Pearson
President, New York, New Haven & Hartford

Coming from Mr. Pearson, these statements are particularly significant, because he himself has been through the mill and now holds what is generally conceded to be one of the most difficult railway jobs in the United States. His counsel and advice should be especially welcome to the young railway maintenance man, because he himself spent seven years in the maintenance of way department as bridge supervisor and division engineer.

He demonstrated his own ability to obtain a thorough grasp of the practical side when he was promoted to supervisor of bridges, buildings and water service on the Northern Pacific in 1885. All his previous training had been in engineering work—location, construction, etc.—which gave him no direct experience such as would be obtained in the position of foreman. Yet his record as a supervisor demonstrated that he understood the details thoroughly. His suggestions to a young man on this score are helpful.

"No matter what position a man holds he must use his eyes to see what is going on around him and also develop an acquaintance with the men doing the actual work and thus acquire as wide a knowledge as possible of both men and methods. The young man who has been promoted should remember that as a superior he has not only added responsibilities but also certain advantages over his subordinates, even though they are closer to the job and may know more about the details than he does. His supervisory position enables him to view the work as a whole; he knows what results must be obtained, what money, materials and equipment are available, and this should enable him to foresee the requirements, make the arrangements in advance and be master of the situation."

That Mr. Pearson made consistent efforts to obtain a knowledge of all branches of the railroad business is apparent to anyone familiar with his career. Few railway men have been compelled to adapt themselves to positions of greater variety. After five years as bridge and building supervisor he was advanced to division engineer and after two years in this maintenance of way position he was entrusted in 1892 with the construction of the Chicago terminals of the Wisconsin Central, then under the control of the Northern Pacific. From this position he was transferred in 1894 to the operating department of the Northern Pacific as superintendent of the Yellowstone division and after nine years as an operating officer, during which time he was promoted to assistant general superintendent and was in charge of transportation, he was transferred to the engineering department as chief engineer. But even more abrupt was his change to the Chicago, Milwaukee & St. Paul System in 1905, when he was selected to build the Puget Sound line from Butte, Mont., to the coast.

A series of advancements through positions of so widely varying a nature evidences an ability to learn a great deal about the other fellow's job and this was emphatically demonstrated to those who were associated

with Mr. Pearson in his work on the Puget Sound line. His services in the construction of this new transcontinental route were of especial value because of his intimate knowledge not only of location and construction, but also of the transportation requirements, not alone from the standpoint of the operating officer, but as well from the needs of both the motive power and traffic departments. This was brought out frequently in the location and planning of station layouts and engine districts and terminals. Moreover, his dealings with the contractors also demonstrated a thorough familiarity with the details of mountain railroad construction.

The Puget Sound extension was built during the time when the northwestern states were the scene of strenuous railway expansion and the consequent competition between the roads in their efforts to secure the most reputable contractors created a tendency toward liberal or even loose interpretation of specifications and classifications, but Mr. Pearson guarded this difficult situation with care, giving his division engineers and the contractors to understand that specifications must be strictly enforced, but with such fairness and assistance as would aid them in every manner that was possible and consistent with the obligations under the contracts.

When asked concerning the possibilities of acquiring a working acquaintance with the operating department while employed in maintenance of way work, he said: "A maintenance of way man must acquire a knowledge of operating matters to handle his own work properly. It is one thing to change out a rail, but it is another to do it without endangering or holding up traffic. Handling work trains should also serve to develop a man's practical knowledge of operating matters."

Mr. Pearson places a great deal of emphasis on the need of a broad knowledge of railway transportation which in his own case was no doubt responsible, after the completion of the Puget Sound line in 1911, for his selection as vice-president of the Missouri Pacific in charge of maintenance, operation and construction. In 1915 he became vice-president of the Texas & Pacific in charge of all departments and a year later he was selected for the same position on the New York, New Haven & Hartford, a road with characteristics different in many ways from any with which he had had previous contact; a year later he was advanced to president.

"Do you feel that a man must endeavor to broaden his knowledge from the very start?" he was asked.

"Low down in the ranks," he replied, "a man, first of all, must learn his business. That is, he must be well up in the technical and practical knowledge essential to the work of his department. But as he advances it becomes more and more necessary that he extend his general knowledge of work outside his own department. Except when a man is employed as a general assistant for a railroad executive who is at the head of several departments, he cannot gain this general knowledge of railway matters unless he makes an effort to know more than is required of him in the daily work of his own department."

"Do these requisites cover what you consider are the essentials for success?" he was asked.

"No," he said. "There is one other element. He must be what you might term a human engineer with an ability to lead and imbued with a natural trait toward interest in the welfare of his subordinates, no matter how humble their positions. A man can't watch his subordinates all the time and if his attitude towards them is such that they all feel that 'the old man is all right,' they will work for him whether he is on the job or not."

This, in a measure, is an expression of Mr. Pearson's attitude toward his own men and their work. He is a hard taskmaster and will quickly dispose of any subordinate who does not measure up to his work, particularly if he has made an obvious attempt to "put it over." On the other hand, he finds keen pleasure in expressing appreciation to those who have done well and in giving a square deal to every one who is square with his own job. He is given to sharp criticism whenever he feels that the circumstances justify it, yet he has the greatest respect for the man who is ready to stand up for his own convictions. To him railway operation and the contact it brings with railway men is a real recompense for the sacrifices it requires. This he has summarized in a letter which appeared under his name in the New York Evening Post of September 6, 1921.

"The difficulties, the continued care which is imperative and the skill that is necessary, have developed in the business of transportation a body of men, careful, courageous, big-hearted, red-blooded, experienced and competent, with whom it is not only a pleasure but a privilege to be associated. Advancement among such a body to the positions of authority and prominence of which necessarily in such a large undertaking there are many is not only difficult, but gratifying to those who succeed."

Why Old Ties Are Burned

IN REPLY to inquiries regarding the burning of old railroad ties, Samuel Porcher, general purchasing agent of the Pennsylvania System, has issued the following statement:

Piles of wornout cross ties in process of being burned by repair gangs are a fairly familiar sight along railroad rights of way. Every now and then someone observing this practice writes a letter to the management of the railroad, or more often to a newspaper, protesting against what he supposes to be a needless waste, and raising the question why the railroad companies do not allow people to take the old ties for fuel, or find some other use for them. The question is not an unnatural one, and the Pennsylvania Railroad management is glad to answer it.

In the first place, it is far from true that all the old ties are burned. A considerable number are sold to persons living on or near the right of way, who buy them at nominal prices, usually 10 or 15 cents apiece, and use them for firewood. That is about as far as the railroad company has been able to go, thus far, in finding an outlet for wornout ties. Such a method of disposal is practicable only in those cases where the ties can be delivered at a public crossing, or other point, where they can be obtained safely by the users, and where the cost of so delivering them does not exceed the prices obtainable.

The company cannot sanction the public going promiscuously over tracks and through yards to gather up old ties, as to do so would be practically letting down the bars against trespassing on the tracks, an evil against which the Pennsylvania has struggled for years, and which has been the cause of about half of all the fatal accidents on railroads in the United States.

Efforts have been made to interest dealers in firewood in buying the old ties, but without much success thus far. The causes appear to be that the old ties are often dirty; that they contain more or less stone, grit and slag wedged in the cracks, which might injure the saws used in cutting them; that in many cases they are partly decayed; that they are dried out, and that their fibre is more or less crushed, so that they burn out too quickly. These are among the reasons assigned by dealers who have not been willing to pay the railroad company enough to cover the cost of collecting the ties and delivering them to points along the line at which they could be removed.

Railway Crossings Should Receive More Careful Attention*

Proper Maintenance Depends Primarily on Good Drainage, Tight Bolts and Adequate Anchorage of the Tracks

By E. D. Swift
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IT IS obvious that, in the abstract, the requisites of crossing maintenance are much the same as those attending other track work, viz., a knowledge of the materials used, of the means through which deterioration occurs and last, but far from least, how the first may best be placed to retard the action of the other. A railroad crossing, as compared with ordinary track fixtures, is a highly specialized piece of equipment which is subjected to more severe stress than any other part of the track. These conditions call for special knowledge and treatment, which they frequently do not receive in proper measure.

The Foundation

It is not often that the maintenance man has an opportunity to make special arrangements for the sub grade, for usually at least one road is in operation before the need for a crossing develops. However, there can be no doubt but what maintenance would be made much easier if the sub grade was made of a well consolidated, nonporous material, properly pitched or crowned to aid in drainage.

Water is an enemy of all track and the arch enemy of crossings and where we fail to keep it on the run there can be no such thing as proper crossing conditions regardless of other provisions. But notwithstanding this common information we do not, as a rule, square our performance with our knowledge of the facts. Physical conditions often do not lend themselves to convenient drainage. Shortage of help and inability to get suitable materials are contributing obstacles, but I cannot imagine any really bad drainage condition which cannot be helped after a careful investigation of local conditions. I know of a case involving a layout of between 20 and 30 crossings located in a low flat place which would, geyser like, squirt semi-fluid mud under each passing train. This condition was largely overcome by the simple expedient of sinking in the spaces between the crossings barrels which had been bored full of holes. As the water flowed into these it was baled out.

At locations where the ground adjacent to the roadbed is sufficiently low, and where all of the crossings may be reached without crossing the tracks, French drains with their bottoms well below the level of the bottom of the ballast under the crossings, and their head ends close up to the rails, afford good means for carrying water out of the ballast in the crossing areas. Surface ditches don't amount to much, as it is impracticable to get them low enough to reach the bottom of the ballast.

In places where the ground is flat or the grade line is but little above ground level, in congested areas such as are encountered in large terminals, in fact in any location in which the final outlet is at a considerable distance from the crossings, good drainage can hardly be provided except by well considered and constructed piping arrangements. In an important layout of new crossings which I had to do with some years ago, a system of drainage was provided with outlet to a city sewer, and several catch basins were placed about the crossings with sumps to catch and hold the solids. Radiating out from these sumps lines of cast iron pipe were laid with their inlets located in the spaces between crossings. These inlets were formed of vertical pieces of pipe bored full of holes and topped with globe shaped gratings about the size of a man's head.

Proper drainage depends so largely on good ballast and the function of ballast is so largely one of providing drainage that consideration of one interlocks with the other. I consider coarse crushed slag an ideal ballast for crossings, but whether of this or other material, it should be considerably coarser than would be desirable for ordinary track. The ballast bed should be as thick as other conditions will permit. Ordinarily, I believe the bottom of the ballast should not be lower than the sub drainage. No ballast will function, however, if it is not kept clean so that water may find its way through readily and escape.

Ballast in crossing areas requires much more frequent cleaning than in ordinary track, not only because the conditions which create fouling are contributed from two tracks as compared to one outside of the crossing area, but also owing to the fact that greater shocks to rolling equipment cause greater quantities of fine material such as sand, coal dust, etc., to be shaken from cars onto the tracks. The most dominant consideration for cleaning ballast frequently is that crossings need more and better drainage than any other part of the track.

The Ties or Crossing Timbers

As a general proposition a tie plan should be provided for each crossing, as a matter of convenience in ordering and placing renewals. The tie layout should be planned not only with a view to a bill of materials but also with the idea of placing the individual members where they will do the most good.

Tie layouts are of two arrangements, depending on the angle. In one the timbers, usually heavier than ordinary crossing ties, are placed parallel to the rails of one

*Abstract of a paper and ensuing discussion presented before the Maintenance of Way Club of Chicago on February 15.

track. In the other the ties are placed perpendicular to the long diagonal of the crossing, thus bringing the ties on a diagonal which offers the same support for all rails. It is the usual custom to use the parallel arrangement for crossings falling within the angles of from about 40 to 90 deg., but there is considerable variation in practice within certain limits for the smaller angles. My personal preference is for the diagonal method for all angles within the limits of an 18-ft. tie at the heel of the end frogs; this is also about the limit of the parallel method unless timbers more than 12 ft. in length are to be used. We find it hard to find timbers as long as this which will not warp in service.

The Crossing

Railroad crossings may be grouped roughly as rail crossings and manganese crossings. Each of these groups may be separated into two principal types. In the rail group there are frog crossings and miter crossings, and in the manganese group solid crossings and fabricated crossings.

There is a marked difference in the assemblage of parts and means of fabrication in frog crossings and miter crossings which has an important bearing on maintenance demands. The miter type, other conditions being equal, requires far more maintenance in order to obtain like results. The reason for this is that while the frog type of crossing is reinforced, or spliced across the intersecting flangeways by two of its main members, the wing rails, and this for both routes through the crossing, the miter type has but one member, and that a rather weak one—a filler extending across the flangeway. Furthermore, this splicing exists for but one of the routes. In the other route all members stop at the flangeway except the bolts which hold the parts together. Mechanically the miter crossing is defective. This does not mean that there is much choice in determining the type that may be used in any given instance, as the question is settled within narrow bounds by manufacturing limitations, the frog type being used for all angles within limits of practicable bending of rails for forming the frog points. To the difficulties of maintenance inherent in the miter crossing due to manufacturing limitations, there is the additional unfavorable condition that as the angle approaches 90 deg. there is a greater wheel shock due to the more abrupt crossing of the flangeways.

Bolts

The need for good bolting and *good bolts* cannot be overstated. It has been my observation that the desirability of using high grade bolts in crossings is sufficiently recognized that they are generally specified in new crossings, but that in a somewhat characteristic lack of "follow through" we drop back to ordinary commercial grades or old material reworked from scrap when it comes to repairs. I am very doubtful whether the difference in cost of the cheapest bolt and the best which is procurable is as much as the labor cost for making renewals, bearing in mind that it is no simple task to line up a lot of crossing parts in order to get a new bolt in place.

When the bolting in a miter crossing is permitted to get loose the threads of the bolts are damaged by the chattering of nutlocks and washers. An unusual loading is thrown onto the fillers, frequently breaking them. There is an unnecessary battering of rails at the flangeways. Excessive jolting of rolling stock takes place, with not infrequent breakage of springs, spring hangers, truck frames, etc. After this condition has existed for a short while the deterioration becomes so extensive that it is difficult to make substantial repairs.

To repeat, good bolts and bolting are prime requisites in the economical maintenance of crossings, but keep in mind that we do not get good bolts unless good workmanship as well as good materials are used in their manufacture, and that by the same token installing good bolts but not maintaining them tight will not result in good bolting.

But let us also not overlook the importance of good nuts. I don't place much dependence on nutlocks. Some have a measure of merit, others are worse than useless. Given good bolts, I will stake my all on a strong back and a four-foot wrench. Cotter pins and the splitting of the ends are poor practice—not harmful in themselves, but they encourage neglect if there is a tendency that way.

Line and Surface

Line and surface are of the essence of good railroading. Poor line or surface may be traceable to one or a combination of causes, but good line and surface are pretty conclusive evidence that not only one but probably a number of matters have been well taken care of. They show that the man on the job is riding it rather than that the job is riding him.

There is one prominent cause for poor alinement through crossings to which it might be well to refer, particularly as it is attended with heavy expense, and the cure is relatively simple. When crossings are forced out of line by the running of one or both tracks it is proof that there is insufficient anchorage of the tracks outside of the crossing. The anchorage may be good enough so that the track or tracks which are causing the trouble are not suffering noticeably themselves because of this running. Probably the creeping of an inch or so outside of the crossings does not produce a bad condition, but carried into the crossing, particularly on roads of two or more tracks, where the creeping is in opposite directions on adjacent tracks, a very serious condition is produced.

Poor line is a source of considerable expense in several directions. There is the labor cost for correction, the heavy wear and tear on rails and fastenings, excessive strain on the crossing bolts caused by side pressure of wheel flanges, and possible slippage of locomotive tires. If more than the usual amount of anchorage is necessary to correct the trouble, apply it. It is simple and cheap compared to the cost of making repairs, to say nothing of other and graver possibilities.

Repairs by Welding

The battering down of the points of crossings is a prominent feature of deterioration. Restoration in a measure which effects substantial improvement is possible by autogenuous welding. On the Belt Railway we repaired a number of crossings in one of the busiest layouts in Chicago last fall by oxy-acetylene welding. Some of these crossings would have had to have been changed out before winter if these repairs had not been made. The work was done under traffic at a cost of approximately $50 per crossing. These crossings new would have cost somewhat more than $600.

Until recently the repair of manganese by welding has been generally considered impracticable if not impossible. We now have in our tracks a solid manganese crossing of 76 deg. which, after a life of between 5 and 6 years, failed through pieces breaking out of two of the corners. The other corners were badly worn and there were cracks in the flangeway intersections. The corners from which the pieces broke were also badly fractured otherwise. This crossing, after laying in the scrap pile for a year or more, was repaired by electric arc welding. It was reinstalled on July 1, 1921, and is still in the track. This process is still in its infancy, but I believe it offers opportunities for marked economies in maintenance of track.

Discussion

The initial discussion of this paper hinged largely on the repair of crossings by autogenous welding, particularly with the use of the electric arc on manganese steel, a relatively recent development. This process has come to light through the perfecting of a silicon coating for the manganese steel rods which are used in this work, the silicon forming a flux over the surface of the melted metal, and thereby protecting it from oxidation which would take place upon exposure to the atmosphere. Through this means the composition of the metal remains unchanged during the period that it is in the molten state.

A. C. Bradley (C. R. I. & P.) described the replacing of a piece 6 in. long and from ¼ to ¾ in. deep, which had broken out of a manganese crossing in Chicago, which has given good service for a number of months but has recently shown cracks. J. J. Desmond (I. C.) described similar work on another crossing which extended its life six months.

Mr. Swift pointed out that experience thus far indicates that the old metal in the break must be carefully ground out before the new metal is introduced. He also stated that the electric arc welding leaves a rougher surface than the oxy-acetylene welding, but that this roughness is soon overcome by the rolling action of traffic. The discussion on the subject of electric welding brought out the fact that it is not practicable in the present state of the art to weld together portions that have separated or to weld a crack.

D. O'Hern (E. J. & E.) emphasized the importance of good foundations for crossings and spoke very highly of the use of concrete slabs. He stated that the amount of ballast should vary anywhere from 8 to 12 in. and was a matter to be left to the judgment of the maintenance of way officer in charge. The slabs with which he is familiar are 22 in. thick. Mr. O'Hern criticized the use of heavy slag for ballasting at crossings because of the difficulty of making small lifts, such as ½ in. or 1 in. He favored one-inch slag or slag screenings. Emil Rost (B. & O.) also testified to the advantage of the concrete slabs.

The question of rail anchors was also discussed at some length and the importance of anchoring the track each way from the crossing was emphasized by a number of speakers. Particular attention was called to this by J. H. Oppelt (N. Y. C. & St. L.), who also raised a question as to the possibility of the greater use of continuous rail crossings as a means of cutting down the wear and tear on both the track and equipment. The use of such crossings, which must be operated in connection with interlocking, places particular emphasis on anchoring the crossing securely. P. J. McAndrews (C. & N. W.) pointed out the fact that anchoring the crossing alone would not serve, but that it is necessary to anchor the track a sufficient distance in each direction to overcome the creeping tendency. W. H. Penfield (C. M. & St. P.) inquired as to whether any railroad responsible for the maintenance of a crossing had found it of advantage to place anchors on the track of the other railroad in order to reduce maintenance at the crossing.

W. F. Rench (*Railway Maintenance Engineer*) questioned the use of a four-foot wrench, owing to the possible overstressing of the bolt. In reply Mr. Swift cited a test of a number of types of ¾-in. bolts, of ordinary carbon steel as well as heat treated, screwed up as tight as two men could force them with a long wrench. In no case were there any failures as a result of stretching the bolts. He ascribed the failure of bolts from wrenching to torsion or twisting resulting from a failure of the nut to turn properly when efforts were made to tighten it.

In answer to a question concerning tight gage in crossings, A. M. Cornell (Pettibone Mulliken Company) stated that manufacturers assembled the crossings in the shop before shipment to insure that they were correct, but that he had found that it was almost impossible to obtain exactly the same conditions when the crossing was assembled in the track. He thought, however, that it would be a good thing to make crossings 4 ft. 8¾ in. gage instead of 4 ft. 8½ in., providing that the flangeways were widened to correspond to the change of gage. Mr. Cornell also discussed the relative merits of the rolled and cast manganese crossings. In his opinion, the principal advantage of the use of cast manganese construction lay in the elimination of the many bolts required for the ordinary fabricated rolled steel crossing and that the use of rolled manganese steel rails had no advantage in this respect over carbon steel rails.

Prize Awards on the Southern Pacific in Texas and Louisiana

THE NAMES of those who were fortunate this year in receiving prizes for excellence in condition of tracks and property on the Southern Pacific, Texas and Louisiana lines, have recently been announced. This award is based on a grading of the various sections made during the course of the annual inspection held between November 7 and December 8, 1921. The inspection party included G. S. Waid and J. H. R. Parsons, vice-president and general manager of the Texas lines and Louisiana lines, respectively; H. M. Lull, chief engineer, and the various division and supervisory officers, including roadmasters, master carpenters, etc.

As in previous years, three cash prizes were awarded on each roadmaster's district. These include a first prize of $100, a second of $75 and a third prize of $50. Under the rules in force one of the prizes on each roadmaster's district is awarded to a foreman on a branch line section, providing there are branch lines on the district. The object of this is to give the branch line foremen an opportunity of competing for the award in spite of the fact that their standard of maintenance is not as high. A record of these awards follows:

The names of foremen who received $100 are as follows:

P. P. Marion, El Paso division; J. T. Perkins, Houston division; George Caufield, El Paso division; D. P. Green, Lafayette division; J. Boehm, Houston division; N. H. Free, Beaumont-Galveston division; R. L. Smith, El Paso division; Chas. Halbert, Houston Terminals division; Ed Williams, Austin division; H. Hanna, Houston division; H. Mahler, Houston division; L. B. Wallace, Dallas division; G. E. Kessler, Dallas division; E. G. Short, Beaumont-Galveston division; J. B. Harmon, Austin division; B. F. Thompson, Dallas division; C. M. Williams, Shreveport division; C. J. Salinas, Beaumont-Galveston division; Jesus Rodriguez, E. J. Ashworth, Lafayette division; F. Foote, L. C. & N. division; R. R. Blankenship, Shreveport division; S. L. Buniff, New Orleans Terminals division; D. Bergeron, Lafayette division; E. W. Simpson, Victoria division; S. J. Farris, Victoria division; W. B. Quine, Victoria division; Jim Wier, Beaumont-Galveston division; W. J. Brock, Dallas division; L. B. Scott, Lafayette division; J. Revelis, Beaumont-Galveston division.

The names of foremen who received $75 are as follows:

J. W. Power, El Paso division; R. M. Heath, Houston division; F. Samuels, Houston Terminals division; W. L. Harper, El Paso division; S. H. Sauls, Beaumont-Galveston division; W. Shaw, El Paso division; G. H. Jenkins, Houston division; W. S. Chrisco, Houston division; S. A. Graham, Austin division; W. G. Fowler, Dallas division; J. Nulty, Houston division; L. L. Dasch, Lafayette division; C. L. Smith, Dallas division; J. J. Mason, Beaumont-Galveston division; L. H. Barr, Austin division; J. W. Atkinson, Shreveport division; T. T. Romero, Lafayette division; P. Adams, Beaumont-Galveston division; W. O. White, Shreve-

port division; A. M. Hostetter, Dallas division; J. A. Evans, Victoria division; W. L. McKnight, Dallas division; F. Graham, Lafayette division; Raymond Brown, Victoria division; C. W. Barker, Beaumont-Galveston division; J. H. Miller, L. C. & N. division; J. M. Langley, Beaumont-Galveston division; J. R. Simmons, New Orleans division; J. H. Nero, Victoria division; J. B. Middleton, Lafayette division.

The names of foremen who received $50 are as follows:

Pat Crowley, El Paso division; S. J. Stewart, El Paso division; S. Crabtree, El Paso division; R. S. Ladner, Beaumont-Galveston division; R. Bridges, Houston division; W. A. Adams, Houston division; E. Speed, Houston division; H. C. Fleming, Austin division; John Gray, Dallas division; S. L. Usrey, Shreveport division; James Dixon, Houston Terminals division; V. H. Dickey, Lafayette division; S. O. Foster, Austin division; E. E. Johnson, Beaumont-Galveston division; L. B. Kinnard, Beaumont-Galveston division; R. J. Pruitt, Dallas division; H. C. Michael, Shreveport division; H. Johnson, Beaumont-Galveston division; J. H. Hinton, Victoria division; A. C. Rodriguez, Houston division; W. B. Taylor, L. C. & N. division; C. E. Howell, Dallas division; W. M. Summers, Jacksonville division; W. T. Cowart, Dallas division; H. Richardson, New Orleans Terminals division; A. E. Spaulding, Lafayette division; Eugene Dodge, Lafayette division; J. C. Beard, Victoria division; R. Nolan, Lafayette division; C. Winborn, Victoria division.

Labor Board to Hold Hearings on Wages

ON FEBRUARY 23 the United States Railway Labor Board announced the plan of procedure for wage hearings to begin on March 6. About 175 roads have filed submissions with the board covering negotiations with various classes of employees for reductions in wages upon which no agreement could be reached. Most of the submissions made by the railroads included controversies with the Brotherhood of Maintenance of Way Employees and Railway Shop Laborers concerning proposed reductions in wages of employees represented by that union. Certain of the brotherhoods have also filed submissions containing counter proposals for advances in wages and among these are 20 cases involving petitions for wage advances for maintenance of way employees.

The Labor Board is enabled to take up the wage cases because the National Agreement cases are now practically completed. During the month a new agreement for the signal employees was announced, which provides for straight time for the ninth hour and punitive time for the tenth and succeeding hours, and also provides for split tricks or intermittent service for any eight hours within a spread of 12 hours. On February 23 an agreement was issued covering stationary firemen and oilers, with modifications in the clauses covering scope so as to include a number of employees heretofore covered by the agreement with the Brotherhood of Maintenance of Way Employees and Railway Shop Laborers. However, in most cases this concerns the shop laborers rather than the maintenance of way employees, an exception to this being the hoisting engineers, who are now specifically covered by the fireman's and oiler's agreement. As in the case of the maintenance of way employees, this agreement provides for the payment of straight time for the ninth and tenth hours.

Considerable speculation was raised concerning the meeting held late in the month between representatives of railway brotherhoods and officers of the United Mine Workers of America, looking to a co-operative arrangement in connection with the threatened strike of the miners. However, as these negotiations progressed it became apparent that the railway men were not inclined to enter into an agreement for any definite action in connection with the strike, but will hold conferences to consider "ways and means."

The following are summaries of miscellaneous decisions of the Labor Board concerning minor cases relating to maintenance of way employees:

Bridge Supervisor May Replace Foreman

A man, who entered service with the Fort Worth & Denver City in March, 1904, was promoted to bridge and building foreman in 1907 and then appointed bridge and building supervisor on January 1, 1920, with the Wichita Valley Railway. In January, 1921, he was transferred to a similar position on the Fort Worth & Denver City Railway. On March 16, 1921, he was demoted to a position as bridge and building foreman again, displacing a man who was his junior in the service. The decision of the board sustained the carrier's position as to the seniority of the supervisor. (Decision 592.)

Should Foremen Be Paid Overtime for Supervising Gangs Sundays and Holidays?

The following question was brought before the Labor Board: "Should employees in supervisory capacities in maintenance of way service—such as foremen, bridge and building department, section foremen, etc.—receive extra compensation when required to supervise their gangs on Sundays and holidays?" The section of the National Agreement applying to this is as follows: "(h) Employees whose responsibilities and or supervisory duties require service in excess of the working hours or days assigned for the general force, will be compensated on a monthly rate to cover all services rendered, except that when such employees are required to perform work which is not a part of their responsibilities or supervisory duties, on Sundays or in excess of the established working hours, such work will be paid for on the basis provided in these rules in addition to the monthly rate. For such employees, now paid on an hourly rate, apply the monthly rate, determined by multiplying the hourly rate by 208. Section foremen required to walk or patrol track on Sundays shall be paid therefor, on the basis provided in these rules, in addition to the monthly rate."

The Labor Board has decided that in the event that no agreement has been reached, effective December 16, 1921, section (h) of Article V of Decision No. 501 shall apply in the manner provided therein. For all service considered as overtime, for which extra compensation is provided, the hourly rate of pay for such service shall be predicated upon 204 hours per month, in accordance with section (e), Article V of Decision No. 501, regardless of the hours or days that may be considered as the regular assignment of monthly-rated supervisory forces. (Decision No. 593.)

Demoted Supervisory Officer Entitled to Seniority as Foreman

In a case concerning an assistant roadmaster on the Michigan Central who was demoted to section foreman, the employees objected to his displacement as section foreman, maintaining that as an assistant roadmaster is outside the scope of the agreement, a man in that position has no seniority rights under the agreement. The board decided that appointment to the position of assistant roadmaster did not constitute a temporary appointment and that his service with the company was not disturbed by that appointment; further, that as a result of his demotion he was entitled to a position as section fore-

man by displacing the junior section foreman in point of service, but that this foreman could be displaced only if he is the junior foreman. (Decision No. 594.)

Employees Who Failed to Report for Work Not Entitled to Pay

Two bridge and building mechanics of the Nashville, Chattanooga & St. Louis were temporarily out of service and notices sent to them concerning a newly organized paint gang were not received. When they did hear of these positions they applied for them, but were denied employment because the quota was full. The railroad recognized their seniority and stated that they would have been accepted if they had applied for the positions in time. The board held that the claim of the two men for pay during the time that this gang was in service was not justified. (Decision No. 603.)

How to Pay Roustabout Carpenters

In a case recently presented before the board a question was raised as to the manner of paying a roustabout carpenter on the Louisville & Nashville under the terms of the national agreement. The man made his headquarters at Knoxville, but was assigned to a carpenter gang, which moved from place to place in boarding cars. The roustabout carpenter reported to the carpenter foreman of the gang, but was himself engaged in miscellaneous work over the line under his own supervision, simply making material and work reports to the foreman at the end of the week. The railroad paid him on the basis of 10 hours per day at pro rata rates in accordance with Section i of Article V of the National Agreement. The employees contended that Section m of the same article was the one which applied in his case. Sections i and m are quoted below:

"(i) Employees temporarily or permanently assigned to duties requiring variable hours, working on or traveling over an assigned territory and away from and out of reach of their regular boarding and lodging places or output cars, will provide board and lodging at their own expense and will be allowed time at the rate of 10 hours per day at pro rata rates and in addition pay for actual time worked in excess of 8 hours on the bases provided in these rules, excluding time traveling or waiting. When working at points accessible to regular boarding and lodging places or outfit cars, the provisions of this rule will not apply."

"(m) Employees not in outfit cars will be allowed straight time for actual time traveling by train, by direction of the management, during or outside of regular work period or during overtime hours either on or off assigned territory, except as otherwise provided for in these rules. Employees will not be allowed time while traveling, in the exercise of seniority rights or between their homes and designated assembling points or for other personal reasons."

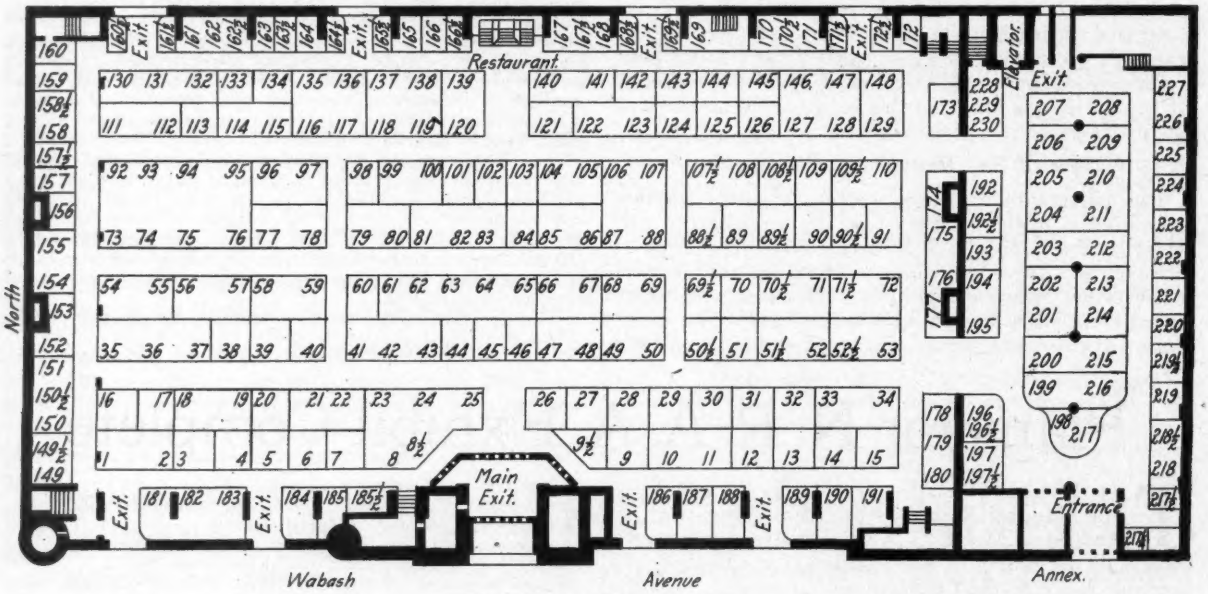
The decision of the board sustained the position of the railroad. (Decision 649.)

Plans for N. R. A. A. Exhibit Complete

THE PRESENT status of plans for the exhibit of the National Railway Appliances Association, to be held on March 13 to 16, inclusive, forecasts the success of the exhibit of this association at Chicago. All available space in the Coliseum and annex has been assigned, but efforts are being made to take care of as many additional exhibitors as possible through the subdivision of space already assigned or through possible cancellations by some of the space holders. As the records now stand 174 firms have been assigned space. The list of exhibitors is as follows:

Adams & Westlake Co., Chicago, booths 87, 88, 106 and 107.
Adams Motor & Mfg. Co., Chicago, booths 218 and 218½.
Air Reduction Sales Co., New York, booths 167, 167½ and 168.
American Abrasive Metals Co., Chicago, booth 172.
American Car & Foundry Co., Chicago, booths 203 and 212.
American Chain Co., Inc., Bridgeport, Conn., booths 81, 82 and 83.
American Hoist & Derrick Co., St. Paul, Minn., booth 88½.
American Kron Scale Co., New York, booth 125.
American Malleable Castings Assn., Cleveland, O., booths 181, 182 and 183.
American Radiator Co., Chicago, booth 190.
American Railroad Signal Supervisory Assn., Chicago, booths 198 and 217.
American Railway Bridges & Building Assn., Chicago, booths 198 and 217.
American Steel & Wire Co., Chicago, booths 51½ and 52.
American Valve & Meter Co., Cincinnati, O., booths 130, 131 and 132.
American Vulcanized Fibre Co., Pittsburgh, Pa., booth 126.
Argyle Railway Supply Co., Chicago, booth 163½.
Armco Culvert & Flume Mfrs. Assn., Middletown, O., booths 99 and 100.
Asphalt Block Pavement Co., Toledo, O., booth 166½.
Atkins & Co., E. C., Indianapolis, Ind., booth 219½.
Baker, R. & L. Co., Cleveland, O., booth 225.
Balkwill Manganese Crossing Co., Cleveland, O., booth 201 and 202.
Barrett Co., New York, booths 107½ and 108.
Barrett-Cravens Co., Chicago, booth 14.
Bethlehem Steel Co., Bethlehem, Pa., booths, 118, 119, 137 and 138.
Blaw-Knox Co., Pittsburgh, Pa., booth 89.
Boss Nut Co., Chicago, booths 1 and 2.
Brach Mfg. Co., L. S., Newark, N. J., booth 3.
Brown Hoisting Machinery Co., Cleveland, O., booth 4.
Bucyrus Co., South Milwaukee, Wis., booths 213 and 214.
Bryant Zinc Co., Chicago, booths 154 and 155.
Buda Co., Chicago, booths 61, 62, 63, 64 and 65.
Carbic Mfg. Co., Duluth, Minn., booth 15.
Carter Bloxonend Flooring Co., Chicago, booth 219.
Challenge Co., Batavia, Ill., booth 109.
Chicago Bridge & Iron Works, Chicago, booths 33 and 34.
Chicago Flag & Decorating Co., Chicago, booth 189.
Chicago Malleable Castings Co., West Pullman, Chicago, booth 142.
Chicago Pneumatic Tool Co., Chicago, booths 200 and 215.
Chicago Railway Signal & Supply Co., Chicago, booths 77 and 78.
Central Electric Co., Chicago, booth 17.
Cleveland Railway Supply Co., Cleveland, O., booth 133.
Crerar, Adams & Co., Chicago, booth 28.
Creepcheck Co., Hoboken, N. J., booth 5.
Chipman Chemical Engineering Co., Inc., New York, booth 90½.
Culvert Co., L. & R., Chicago, booth 192½.
Delco-Light Co., Dayton, O., booth 7.
Detroit Graphite Co., Chicago, booth 108½.
Detroit Steel Products Co., Detroit, Mich., booth 166.
Diamond State Fibre Co., Bridgeport, Pa., booth 51.
Dickinson, Paul, Inc., Chicago, booth 98.
Dilworth, Porter & Co., Inc., Pittsburgh, Pa., booth 27.
Direct Sales Co., Chicago, booth 156.
Doty Business Machines Co., Chicago, booth 164.
Duff Mfg. Co., Pittsburgh, Pa., booth 89½.
Edison Storage Battery Co., Orange, N. J., booth 20.
Edison, Thos. A., Inc., Bloomfield, N. J., booths 18 and 19.
Electric Storage Battery Co., Philadelphia, Pa., booth 60.
Elwell-Parker Electric Co., Cleveland, O., booths 226 and 227.
Engineering & Contracting Publishing Co., Chicago, booth 165.
Eymon Crossing Co., Marion, O., booth 169½.
Fairbanks, Morse & Co., Chicago, booths 73, 74, 75, 76, 92, 93, 94 and 95.
Fairmont Gas Engine & Railway Motor Car Co., Fairmont, Minn., booths 41, 42 and 43.
Federal Signal Co., Albany, N. Y., booths 47 and 48.
Federal Electric Co., Chicago, booth 169.
Ferguson Co., H. K., Cleveland, O., booths 152 and 153.
Flannery Bolt Co., Pittsburgh, Pa., booth 90.
Frog, Switch & Mfg. Co., Carlisle, Pa., booths 52½ and 53.
General Automatic Scale Co., St. Louis, Mo., booth 134.
General Electric Company, Schenectady, N. Y., booths 35, 36 and 37.
General Railway Signal Co., Rochester, N. Y., booth 49 and 50.
Gosso Co., Chicago, booth 168½.
Graver Corporation, Chicago, booths 96 and 97.
Gurley, W. & L. E., Troy, N. Y., booth 69½.
Hall Switch & Signal Co., Garwood, N. J., booths 85 and 86.
Hayes Track Appliance Co., Richmond, Ind., booths 140 and 141.
Hazard Mfg. Co., Chicago, booths 21 and 22.
Headley Good Roads Co., Philadelphia, Pa., booths 158 and 158½.
Howlett Construction Co., Moline, Ill., booth 187.

Hubbard & Co., Pittsburgh, Pa., booth 143.
Illinois Steel Co., Chicago, booths 70½ and 71.
Ingersoll-Rand Co., New York, booths 206 and 209.
Johns-Manville, Inc., New York, booths 174, 175, 176 and 177.
Jordan Co., O. F., East Chicago, Ind., booths 56 and 57.
Kalamazoo Railway Supply Co., Kalamazoo, Mich., booths 23, 24, 25, 8 and 8½.
Kaustine Co., Inc., Buffalo, N. Y., booth 29.
Kelly-Derby Co., Inc., Chicago, booth 30.
Kentucky Rock Asphalt Co., Louisville, Ky., booth 161½.
Kerite Insulated Wire & Cable Co., Inc., Chicago, booths 68 and 69.
Portland Cement Association, Chicago, booth 217½.
Positive Rail Anchor Co., Marion, Ind., booths 178, 179 and 180.
Pyrene Manufacturing Co., Chicago, booth 186.
Q and C Co., New York, booths 120 and 139.
Rail Joint Company, New York, booths 79 and 80.
Railroad Accessories Corp., New York, booth 184.
Railroad Herald, Atlanta, Ga., booth 161½.
Railroad Supply Co., Chicago, booths 104 and 105.
Railway Purchases & Stores, Chicago, booth 163.
Railway Review, Chicago, booth 44.
Ramapo Iron Works, Hillburn, N. Y., booths 109½ and 110.
Raymond Concrete Pile Co., Kansas City, Mo., booth 188.



Floor Plan of the Coliseum

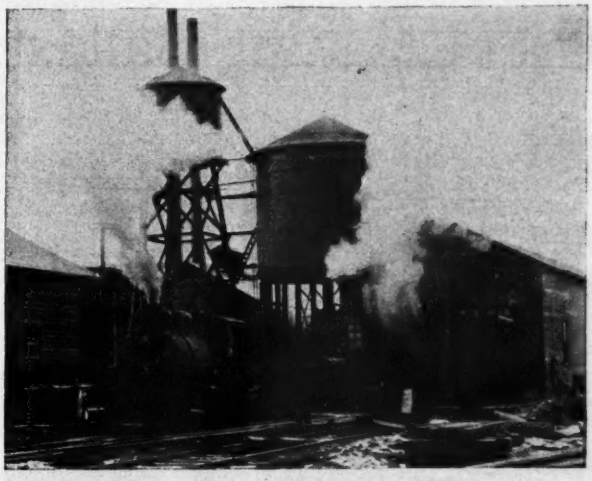
Keuffel & Esser Co., New York, booth 40.
Keystone Tool Grinder & Mfg. Co., Pittsburgh, Pa., booth 193.
Kilbourne & Jacobs Mfg. Co., Columbus, O., booth 45.
Koehring Co., Milwaukee, Wis., booths 207 and 208.
Lehon Co., Chicago, booth 91.
Lorain Steel Co., Johnstown, Pa., booths 204, 205, 210 and 211.
Lufkin Rule Co., Saginaw, Mich., booth 121.
Lundie Engineering Corp., New York, booth 70.
M. W. Supply Co., Philadelphia, Pa., booth 101.
Mac Rae's Blue Book, Chicago, booth 9½.
Magnetic Signal Co., Los Angeles, Cal., booth 165½.
Maintenance Equipment Co., Chicago, booths 194 and 195.
Massey Concrete Products Corp., Chicago, booths 54 and 55.
McGraw-Hill Co., Inc., New York, booth 185½.
Mechanical Mfg. Co., Chicago, booth 172½.
Metal and Thermit Corp., New York, booth 6.
Midvale Steel & Ordnance Co., Cambria Steel Co., Philadelphia, Pa., booths 71½ and 72.
Miller Train Control Corp., Danville, Ill., booths 197 and 197½.
Milwaukee Tank Works, Milwaukee, Wis., booth 220.
Minwax Co., New York, table space.
Morden Frog & Crossing Works, Chicago, booths 199 and 216.
Mudge & Co., Chicago, booths 127, 128, 146 and 147.
National Boiler Washing Co., Chicago, booth 12.
National Carbon Co., Inc., Cleveland, O., booths 150, 150½ and 151.
National Lead Co., New York, booth 9.
National Lock Washer Co., Newark, N. J., booth 192.
National Malleable Castings Co., Cleveland, O., booth 102.
National Railway Appliances Assn., Chicago, booths 198 and 217.
Nichols & Bro., Geo. P., Chicago, booth 173.
Northwestern Motor Co., Eau Claire, Wis., booths 196 and 196½.
Ogle Construction Co., Chicago, booth 157½.
Okonite Co., Passaic, N. J., booth 16.
O'Malley-Beare Valve Co., Chicago, booths 114 and 115.
Oxweld Railroad Service Co., Chicago, booths 10 and 11.
P. & M. Co., Chicago, booths 122 and 123.
Page Steel & Wire Co., New York, booth 84.
Patterson Co., W. W., Pittsburgh, Pa., booth 145.
Pittsburgh Des Moines Steel Co., Pittsburgh, Pa., booth 157.
Pocket List of Railroad Officials, New York, booth 26.
Rawls Machine & Manufacturing Co., Chicago, booths 161, 162 and 162½.
Reade Mfg. Co., Jersey City, N. J., booths 228, 229 and 230.
Reliance Mfg. Co., Massillon, O., booth 221.
Richards-Wilcox Mfg. Co., Aurora, Ill., booths 170, 170½ and 171.
Roadmasters & Maintenance of Way Assn., Sterling, Ill., booths 198 and 217.
Roberts Co., Geo. J., Dayton, O., booth 160½.
Sellers Mfg. Co., Chicago, booth 124.
Signal Accessories Corp., Utica, N. Y., booth 113.
Sherwin-Williams Co., Cleveland, O., booth 13.
Simmons-Boardman Publishing Co., New York, booth 46.
Snow Construction Co., T. W., Chicago, booth 50½.
Signal Men's Assn., Chicago, booths 198 and 217.
Templeton, Kenly & Co., Ltd., Chicago, booth 32.
The Toledo Pipe Threading Machine Co., Toledo, O., booth 31.
Thompson Bros. Co., table space.
Track Specialties Co., New York, booth 39.
Train Control Appliance Co., El Paso, Tex., booth 171½.
Two-Way Rail Anchor, not inc., table space.
Union Switch & Signal Co., Swissvale, Pa., booths 66 and 67.
U. S. Wind Engine & Pump Co., Batavia, Ill., booths 111 and 112.
Verona Tool Works, Pittsburgh, Pa., booths 129 and 148.
Volkhardt Co., Inc., Stapleton, S. I., New York, booth 160.
Wailes Dove-Hermiston Corp., Cleveland, O., booths 149 and 149½.
Warren Tool & Forge Co., Warren, O., booth 222.
Waterbury Battery Co., New York, booth 38.
Wayne Oil Tank & Pump Co., Fort Wayne, Ind., booth 144.
Werner Machine Co., West Allis, Wis., booth 164½.
West Disinfecting Co., Chicago, booth 159.
Western Electric Co., Inc., New York, booths 58 and 59.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., booth 191.
Wharton, Wm., Jr., & Co., Inc., Easton, Pa., booths 116, 117, 135 and 136.
Wood Shovel and Tool Co., Piqua, O., booth 185.
Woods Bros., Construction Co., Lincoln, Neb., booth 224.
Woolery Machine Co., Minneapolis, Minn., booth 223.
Wyoming Shovel Works, Wyoming, Pa., booth 103.

Union Pacific Builds Tie Treating Plant

Installation at Pocatello Advantageously Arranged and Equipped for Operations on Large Scale

The Storage Yard Has a Capacity for 1,250,000 Ties

FOR SOME 18 years treated ties have been used in main line tracks of the Union Pacific System. It is now the practice to treat ties in all tracks. In order to treat the additional number of ties required, a treating plant has been constructed on the Oregon Short Line at Pocatello, Idaho, to fit in with plants at Laramie on the Union Pacific and at Wyeth on the Oregon-Washington Railroad & Navigation Co. The plant at Wyeth will treat ties for lines from Portland to Pocatello, the plant at Pocatello will take care of the requirements from Pocatello to Laramie, Wyoming, including the Los Angeles & Salt Lake railroad, and the plant at Laramie the requirements east of that point.



A Close-up View of the Retort House

Zinc Chloride Treatment Was Adopted

The timbers treated are Douglas fir, mountain pine and tamarack, a considerable production of all of which is being developed on the Oregon Short Line territory in Idaho, Wyoming and Oregon.

The standard tie for all purposes is 7 in. by 9 in. by 8 ft. The treatment is with zinc chloride by Burnettizing process. The capacity of the plant at Pocatello is estimated to be about 1,250,000 ties per year and a storage yard has been provided in order to provide proper seasoning for this number of ties before treatment.

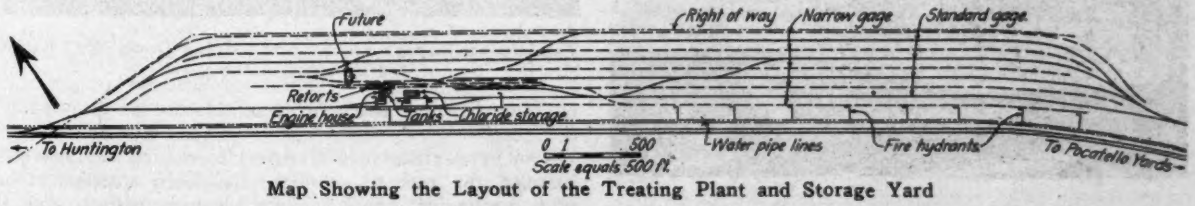
A tract of land comprising 51 acres, particularly adapted for the purpose, was purchased west of the freight terminals and adjacent to the main line at Pocatello, the layout of which is shown by the accompanying map. From this point treated ties will be shipped immediately for distribution to points where they are to be used. The loading dock at the plant, used by narrow gage tram cars, is at the same elevation as the treating retorts, while the tracks for standard gage cars for loading are depressed. All the narrow gage tracks through the storage yard and as far as possible throughout the plant are entirely independent of the standard gage tracks in order to create as little conflict as possible. The gage of the narrow track is 30 in. Tram cars are handled by a dinkey steam engine. This gage was adopted in order to allow a large number of ties per charge.

The equipment consists of 2 treating retorts, each 7 ft. in diameter and 132 ft. long, also

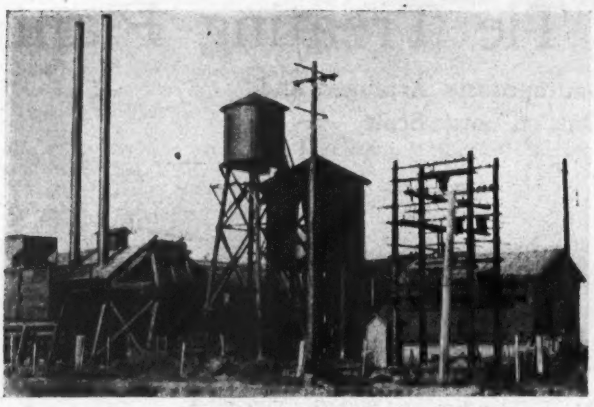
3—100 hp. internally-fired boilers,
1—Two-stage air compressor,
1—Open feed water heater,
4—Duplex piston pumps,
1—Vacuum pump,
2—Measuring tanks,
1—65,000 gal. steel tank for zinc chloride solution,
1—12,000 gal. tank for water,
2—Open steel mixing vats,
1—Air receiver,
3—200 kva transformers,
1—Dinkey steam locomotive.
150—Steel tram cars,

and the necessary complement of gages, scales, thermometers, and apparatus for a small laboratory.

The fuel for the plant is supplied to the boiler plant by an elevated trestle which allows the dumping of the coal into bins at the fire-box doors. All equipment is properly housed. There is a building for storage of chemicals in drums and also a depressed tank for salts in solution and a repair and blacksmith shop. Electric current is secured from hydro-electric plants of the Idaho Power Company and is obtained from the mechanical facilities at Pocatello by a new 11,000-volt transmission line spe-



Map Showing the Layout of the Treating Plant and Storage Yard



Looking at the Treating Plant from the Rear

cially constructed for the purpose and which has also been continued to the railroad's Batise Springs pumping plant one mile farther west. This pumping plant, securing water from a spring on the edge of the Portneuf river, consists of two steam-operated cross-compound pumps and one electric motor-driven 8-in. centrifugal pump, discharging through one 12-in. and one 10-in. pipe line 5,800 ft. long to a concrete reservoir on the point of a mountain 340 ft. above the spring. From the reservoir, gravity lines deliver the water to all facilities at Pocatello and, as noted on map, pass the tie treating plant. Eleven fire hydrants are located in the tie storage yard, opposite avenues provided between the piles of ties. At the end of each avenue there have been located hose houses with sufficient hose to reach all parts of the storage yards quickly.

The climate at Pocatello is such that seasoning for 8 to 9 months secures results fully equal to a much longer period in other localities. The storage of ties was begun early in the present year and the plant was put in operation in October.

The machinery and equipment were purchased in the open market from the lowest bidders. The retorts were furnished by the American Bridge Company; the marine type boilers from the Casey Hedges Co.; the air compressors by Ingersoll-Rand Co.; the pumps by the Worthington Co.; mixing vats, tanks, etc., by the Salt Lake Boiler and Sheet Iron Works; the narrow gage locomotive by the Davenport Locomotive Works; and the tram cars by the Kansas City Structural Iron Works. The installation was made by the regular construction forces of the Oregon Short Line. We are indebted for the above information to W. R. Armstrong, assistant chief engineer, Oregon Short Line, Salt Lake City, Utah.

Labor-Saving Methods for Cleaning Ballast

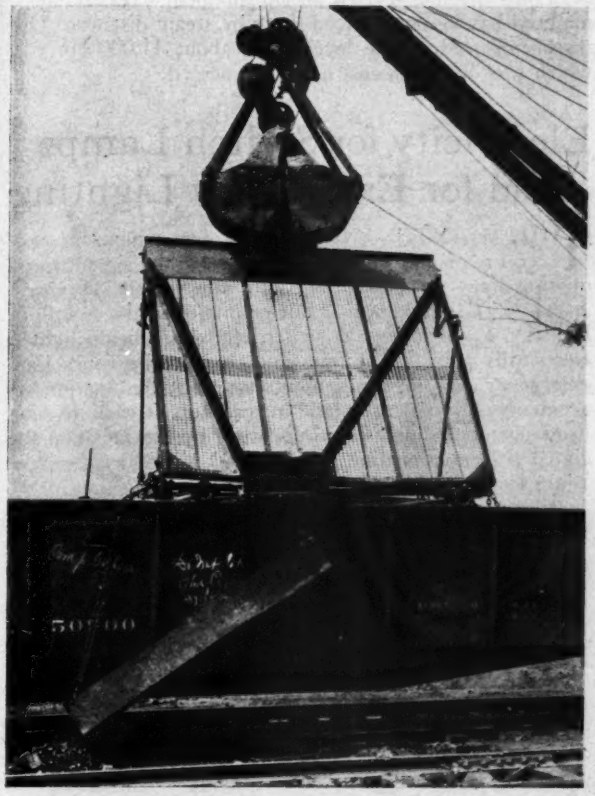
ON MULTIPLE track railways carrying heavy traffic the maintenance of clean ballast to the level of the base of the ties in the inter-tie spaces, and to a depth of 12 in. below the base of the ties in the inter-track spaces, is of first importance. On the eastern portion of the Pennsylvania System it is necessary to clean the ballast every second or third year and in the past the work has been done largely by hand, the foul ballast being excavated to the desired depth with pick and shovel and the dirt shaken out on ballast forks. When done in this way, the work is slow and expensive and absorbs a large amount of labor. During the war labor was scarce and inefficient and much of this work was unavoidably deferred, so that at present there is more than the usual amount of cleaning to be done.

A Rear View of the Screen in Operation

The Bracket Takes a Good "Bite," Going Down Well Below the Bottoms of the Ties

The Pennsylvania, in an effort to reduce the cost and increase the rate of working, has been experimenting with mechanical appliances for cleaning ballast, and in the Pittsburgh district is now obtaining excellent results with large screens mounted on rollers on the sides of gondola cars and locomotive cranes with grab-buckets. While the method that the road has developed is still

in an experimental stage, it should be of interest to those who have had to do with the cleaning of ballast. In the practice of the road in the territory mentioned, the ballast in the inter-tie space is cleaned to the bottom of the



The Construction of the Screen Is Simple, Yet Strong and Efficient

ties and in the inter-track space to 12 to 14 in. below the bottom of the ties.

In doing this work, several slightly different methods are employed, but in general the procedure is as follows:

A small force of men, usually extra gang laborers, fork the ballast, from the two adjacent tracks to the space between tracks. The limit of this forking is the center line of each track, thus making the total forking equivalent to the labor necessary to fork out one track. The ballast in this case is removed down to the bottom of the ties. The ballast in the track center is then picked up by a locomotive crane with a ¾-yard clamshell bucket fitted with special hardened steel teeth extending about six to eight inches out from the bucket edges. It is then swung over a screen mounted on an open top car and the contents dropped, the clean or screened ballast running back through a chute to the track center and the dirt falling through into the car.

The screen is made of heavy wire with about 1½-in. mesh, framed with heavy angle iron and mounted on an adjustable base so arranged that the slope can be changed to suit the conditions. The entire unit is mounted on four wide rollers so that it can be moved or rolled along the top of the car sides. The ballast which does not pass through is deflected into a hopper protected by a shield, through the medium of deflector boards, usually made of metal. These deflector boards are about 12 in. high and extend from top to bottom. The hopper is a rectangular shaped steel box about 3 ft. long, 2 ft. wide and 6 in. deep, thus lying close up to the side of the car and in the "clear" at all times. This hopper discharges into an open chute of the same depth, perpendicular to the side of the car, as the hopper. It is 8 ft. long and 12 in. wide vertically, hinged at one end and supported by a chain at the other. This discharges the cleaned ballast at about the height of the top rail. The ballast returned to the track is then leveled off, some of it being forked back between the rail, after which the track is ready for a light dressing of new stone.

The results obtained, expressed in terms of lineal feet of track, have varied because of different traffic conditions met in carrying out the work and also because of the fact that, owing to the pressing need of ballast cleaning, much of it was done with two shifts of eight hours per day. As was to be expected the night shifts (late afternoon and early evening) did not cover as much ground as the day shifts. The general average of about two-months' work was approximately 950 to 1,000 lin. ft. of center ditch per shift of eight hours. Its possibilities are indicated by the fact that 3,936 ft. was covered on one Sunday, with the two (day and night) shifts, while on one week day a single eight-hour shift cleaned 1,750 lin. ft. of center ditch. In addition to the saving of labor and the greater progress made, the ballast is cleaner than with hand work and less stone is wasted. The first ballast cleaned by this method was in a bad mucky place in the vicinity of Conemaugh, where in the past it had been necessary to hand-clean it at intervals of about six months to prevent pumping. Two years have now elapsed since the ballast was cleaned by the screens, and the track is just beginning to show signs of pumping.

We are indebted to W. D. Wiggins, chief engineer, maintenance of way of the Central region of the Pennsylvania Railroad and to R. Fairies, division engineer, who developed the method described, for the information contained in this article. The screens were built at the Pitcairn shops under direction of George Ehrenfeld, supervisor, who has also had charge of the operation of the machines on the road.

Some Ditching Cost Figures on the Rock Island Lines*

EXPENDITURES for general ditching over the Rock Island during the past six years have averaged $900,000 annually, the work being done by section men, extra gang laborers and teams, supplemented to a more or less extent by steam ditchers, of which this company has 12, the use of the latter being confined principally to cleaning out heavy cuts by loading the material into cars and dumping it on the embankments. The total figures of the comparative amounts expended for hand, team and mechanical ditching are not available for past years, but in 1920 alone over $300,000 was expended for team ditching.

Since that time 3 spreader cars have been provided by the company to supplement the 12 steam ditchers and with this equipment it has been possible to eliminate all team work for ditching, except for some minor work at the foot of slopes, or at points where it was impossible to operate mechanically. The spreader cars are capable of cleaning, ditching and shaping the roadbed at the rate of from 15 to 25 miles per day for both sides of the track, performing work equivalent to that of 300 to 500 men, or from 40 to 100 teams. The savings in maintenance, of course, have been very attractive and it is now believed their use should be further extended to eliminate as far

*From an article which appeared in the Rock Island Magazine for January, 1922.

as possible the hand labor which is still required, also to improve the standard of maintenance and increase general ditching.

The following information, derived from reports of actual operations, affords an idea of what the Rock

A Typical Stretch of Track Scheduled for Ditching

The Same Stretch of Track as the Spreader Car Left It

Island experiences have been in ditching during the past year with spreader cars: In August and September, during the period of observation of the newly purchased spreader cars, one of the machines operating on the El Paso-Amarillo division moved 29,000 cu. yd. of material at a labor cost of $386, or the equivalent of $0.0133 per yd. During the same period a second machine, operating on the St. Louis-Kansas City division, moved 28,000 cu. yd. at a labor cost of $507, or the equivalent of $0.018 per yd. These may be taken as typical of the cost of spreader ditcher service during the season.

A careful check was made of the work done on various divisions by hand during this period, where mechanical ditching was not available, and the costs were found to run variously from 60 cents to 90 cents per yd., although special cases were found to run from $1 to $1.60 per yd.

If, however, the interest on the investment, depreciation, engine rental, etc., be included, the following report of work done on the El Paso division between Amarillo, Tex., and Tucumcari, N. M., during the period May 16 to May 20, 1921, can be taken as a fair example of the cost of performing the work by mechanical means:

Total miles ditching done	58.25
Total miles spreading done	9.75
Total miles roadway completed	68.00
Six days at $77.94 (including cost of spreader operator, train crew, fuel, section laborer and watchman)	$467.64
Engine rental for six days at $25 per day	150.00
Interest, depreciation and repairs	18.00
Total cost	$635.64
Cost per mile of roadway completed	9.35
Cost per lineal foot of roadway completed	0.0017

As another illustration of the work which was done by the spreader cars, in August a machine operating on the St. Louis division leveled an embankment 4,000 ft. long, material having been placed there by steam ditcher. The work consisted of the leveling of about 11,000 cu. yd., which was done at a cost of $0.013 per yd.

Electricity for Switch Lamps and for Emergency Lighting

THE MAINTENANCE of way departments of several roads are beginning to draw on the signal transmission lines for power and light for various purposes, at least in a limited way. For example, on the Southern Railway, Lines West, 30 switch lamps are being lighted electrically as a test at this time, and on the Lines East emergency lighting equipment for the illumination of accidents or washouts is held in readiness at each division headquarters. This is made possible by the fact that the signal transmission line parallels 700 mi. of road on the Lines East and 63 mi. of the Lines West.

While power is available at all points along the signal transmission line, it has not been found practical to light all of the switch lamps electrically, on account of the fact that the transmission is at 4,400 volts, requiring a transformer to reduce the voltage at all points where lamps are used. At signal locations and at the electrically-lighted passenger stations transformers have been installed to step down the high potential to 110 volts for the signal motors and station lights. Only at or close to these locations is the current available for switch lights. The 110 volts as obtained at the signal or station transformer is again reduced by a secondary transformer to 6 volts, to give current adapted to the type of electric lamps used.

From the secondary transformer the 6-volt circuit is carried on two No. 14 rubber covered wires which are run in ½-in. galvanized iron conduit to the switch stand. A condulet with a two-hole porcelain cover is attached to the end of the conduit and the wires are run from there to the switch lamp in a loop in order to allow the lamp to turn when the switch is thrown. The wires enter the lamp either through a hole in the bottom or through the vent opening near the top. The lamps are 5-watt, 6-volt, Masda-B, type S-14, Edison standard medium screw base. At the time that these lamps were electrically equipped the cost for labor and material for each lamp was about $40. The only time these lamps need attention is when the filament burns out or an occasional cleaning of the lens, which work is handled by the signal maintainer along with his other duties.

The successful use of electric motors for the operation of coal chutes, pumping plants or concrete mixers in connection with the signal transmission line depends considerably on the design of the motor starting equipment and the distance from the source of power. With the proper consideration of this point the coal chute at Lula, Ga., on the Lines East, is being operated by a 3-phase, 220-volt, .15-hp. motor. This motor is equipped with a starting compensator and is connected to the signal transmission line through a transformer in each phase. This arrangement is necessary to prevent the motor taking excessive current while starting, which might reduce the line voltage to such a value that the signals would momentarily assume the "stop" indication. This coal chute is 12 mi. from the substation which feeds in all 20 mi. of signals in addition to supply the power for this motor.

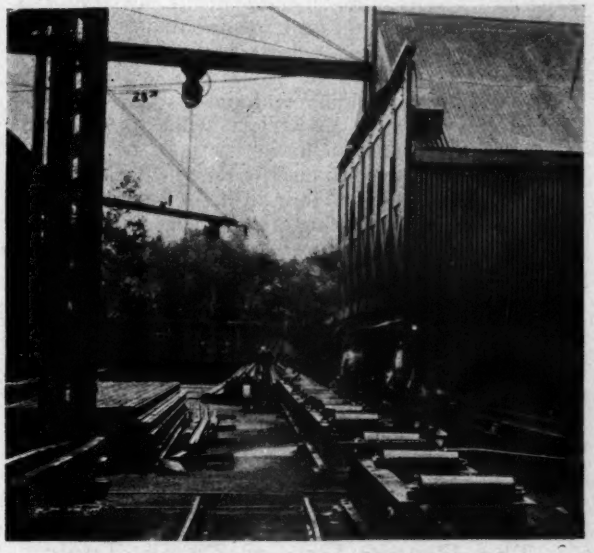
How Rail Is Reclaimed on the B. & O.

Large Scale Sawing and Drilling Operations Carried on With Ease and Economy at Martinsburg Shop

By S. C. Tanner
Superintendent of Shops, Martinsburg, W. Va.

AT THE maintenance of way reclamation shops at Martinsburg, W. Va., a plant has been installed to reclaim worn rail taken from track. The detail of procedure in reclaiming such rail is as follows:

After loading the rail, where removed from track, into gondolas or flat cars, it is shipped to Martinsburg. It is then placed under Crane 1, shown in the accompanying illustration, which lifts the rails from the car and places them one at a time on the rollers (2). These rollers operate by pneumatic power and the rails pass to the far end automatically. At that point the rails are transferred on



Unloading the Rails

declining skids to the rollers (3), which are operated in the same way as rollers (2), but in the opposite direction. The rail is thus moved automatically until the end strikes the stop (4), when a 54-in. electrically-driven friction saw moves up and cuts one end of the rail, this operation requiring but 14 seconds. The saw is then moved back into the clear and the stop (4) turned back, permitting the rail to pass the saw and come in contact with the rollers (6), which move the rail past the stop block (7). The roller (8) is then forced up against the rail by a lever on an eccentric shaft and the rail is moved back by this roller until the end of the rail strikes against the stop (7), whereupon the friction saw moves up and cuts off the other end.

Roller (8) is then dropped and a second roller forced up against base of rail, which moves the rail on the rollers (6) to an equal distance between the drill presses. Compressed air is then turned into the small cylinders (11) under the skids (12), which are hinged at one end. The air cylinders force the free end of these skids upward, which dumps the rail upon the skids (13). The rail is then moved by man power into the drill press (14) and the other end of the next rail into the other drill press (15). After the one end of rail has been drilled in press (14), the rail is then moved to the drill press (16) and other end drilled, after which it is dumped off on skids. Similarly, after the one end of the second rail has been drilled in press (15) the rail is moved to press (18) and when the other end is drilled the rail is also dumped off on the skids.

This arrangement provides for the drilling of one end of four rails at one time. The actual time required to drill three 1 3/16 in. holes in one end of 100-lb. ARA-B rail averages 37 seconds. After the rails have been sawed and drilled and dumped onto the skids, as explained above, they are picked up by the crane (19) and loaded into a car (20) ready for shipment. The movement of the rail is, therefore, continuous from the time it is unloaded by the crane (1) until it has been reloaded by the crane (19) and is ready to go back into the track. The largest number of rails so handled in a day was 310.

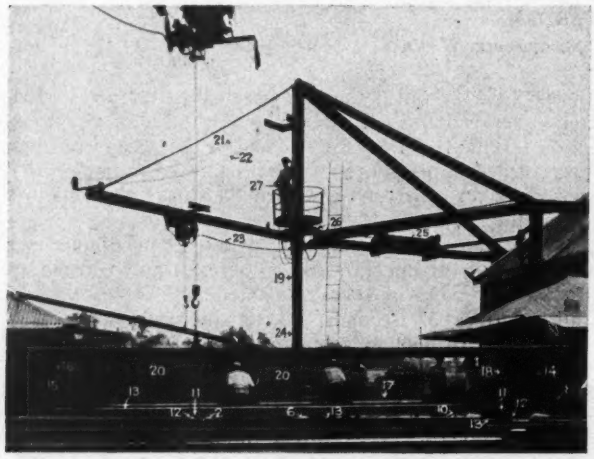
The saw and drill presses are operated electrically in separate units. The cranes, hoists and rollers are operated with compressed air at 95 lb. pressure. It will be noted in the photographs that the cranes are of the jib crane construction with a 12-in. I-beam boom 28 ft. long arranged to swing 180 deg. On the boom is mounted a pneumatic trolley, which supports a one-ton pneumatic hoist. At the heel of the boom is a small platform for the crane operator which is arranged to remove the opera-

The Rail Saw in Action

tor out of danger if an accident to the hoist should occur, as well as to be in a position at all times to permit a clear, unobstructed view of the operation of the crane.

A small closed-link chain (21) is used to operate the valve of the hoist and chain (22) to operate the valve of the trolley, and by the use of small pulleys the chains are made endless, passing the operator's platform, one to his right and one to his left. By a slight pull downward on the hoist chain the load will lower and by slight pull upward on the same chain the load will rise. The chain on the trolley is operated in the same manner and by pulling down on the chain the trolley will move rapidly on the boom in the direction of the mast, while in pulling up the

chain the trolley will move out on the boom. The hose (23) which supplies air to the hoist and the trolley passes over a fixed sheave wheel at the heel of boom with a loose sheave wheel (24) counterweighted on the hose, so arranged as to keep the hose in proper position at all



Loading Out the Re-sawed Rail

times regardless of the location of the trolley and hoist on the boom.

An air cylinder (25) is securely fastened to one of the stiff legs of the crane and is equipped with a rack exten-

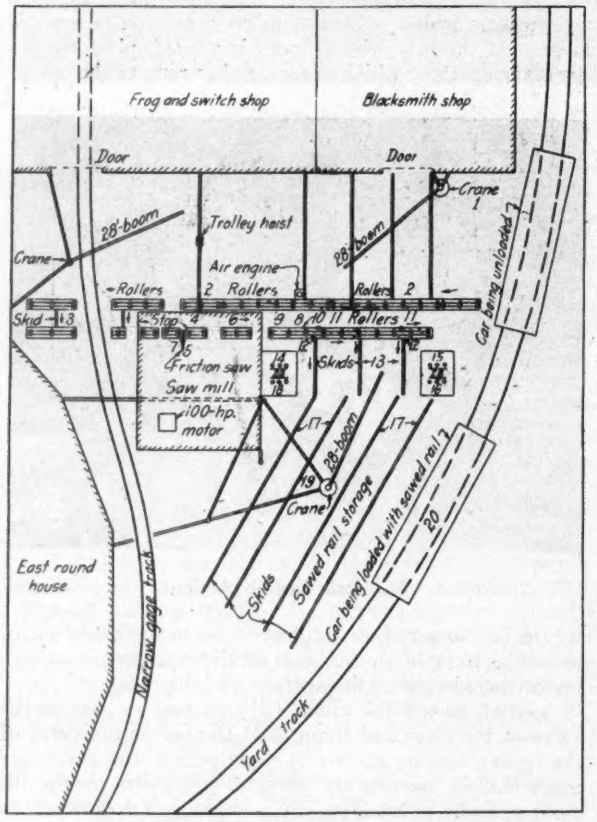


Diagram Plan of the Plant

sion on the end of the piston rod of the air cylinder. This rack engages in the teeth of a 36-in. gear wheel (26), which is made fast to the mast of the crane. An air line connects each end of the cylinder with a four-way valve located directly in front of the crane operator. By operating this valve the crane will turn around in either direction at the operator's will. The drill presses are protected by small steel buildings with sides and ends made of double hinged doors so arranged as to be folded up as shown and to provide an awning over the workmen when the plant is in operation. When the day's work has been finished the folding doors are closed down and hooked across the corners on the inside and thus provide a strong fireproof building over the machines.

The friction saw used for sawing rail at this plant, when new, is ⅜ in. thick and 54¼ in. in diameter. A test was made of the saw, starting on July 23 and ending October 7, when the saw was removed on account of a defect. During the time that it was in service the saw made 21,190 square cuts on reclaimed or short end rail and 2,220 cuts of various angles on rails for use in constructing frogs, crossings and switches or a total of 23,410 cuts, most of which was of 100 lb. ARA-B rail. On removing the saw from the machine the diameter was again measured and found to be 53½ in., showing a reduction of ¾ in. in the diameter of the saw after making 23,410 cuts. The small depreciation of the saw undoubtedly is attributable to the large volume of water used when cutting rail. The power used to feed the saw into the rail is hydraulic pressure and is therefore gradual and uniform, which is without doubt of much value in prolonging the life of the saw.

The force employed to operate this plant includes one supervisor, one sawyer, four drill pressmen, one drill grinder, four men operating the hoist, one at each crane; four men, two at each crane to handle the rail; four men on the skids to place the rail in the drill presses, and four men, two on each side of the saw, to handle the rail.

The cost of unloading, sawing, drilling and loading 131.45 gross tons of rail, including overhead charges, in one day was $78.03, or an average cost per ton of $0.59. The average cost for the month of August, 1921, was as follows:

Total feet sawed	173,320 ft.
Tons of rail sawed	2536.57 tons
Total cost	$2564.27
Cost per ton	1.01

The Proper Use of Track Tools

THE FOLLOWING article, which was prepared by R. V. Johnson, section foreman on the Southern Pacific lines at North Zulch, Tex., was awarded first prize in a contest among section foremen on the use of track tools conducted by H. M. Lull, chief engineer.

"The men who use tools should be properly instructed as to the purposes each tool is made for. They should also be impressed with the importance of using each tool only for the work it was made for, and one tool should not be used to do the work of the other, as this will not only subject it to possible strain and hardship but also cause delay and imperfect service. Tools should be properly oiled at all times and minor defects repaired, where possible, by those who have them in charge. If repairs are not possible, the tools should be sent in at earliest possible date and not be thrown in the scrap pile. Many tools are scrapped when a little work would put them in condition to render months of good service. When they are not in use they should be kept in the tool house, out of the weather. There should be a place in the tool house for each different tool, or class of tools. They should not be left out on line over night or on Sundays.

"Men should use care in handling tools at all times, especially in loading and unloading them on and off cars. Many tools have been broken in throwing them on and off cars."

"Give Her Snoos," Yells the Boss, and the Drive Was On

A Description of the Production of Ties in the Western Mountains Where They Must Be Driven in Flood Streams

BY R. VAN METRE
Vice-President, Joyce Watkins Company, Chicago

UNTIL the period of federal control, when the Forest Products Section of the United States Railroad Administration was organized to take over the procurement of cross ties for the railroads, and this central agency made a study of the sources of production, few realized the vast ramifications and scope of the tie industry. This was quite natural, as the tie operators had gradually extended their field of operations to more remote sections, since those earlier days when nearly every railroad was able to secure its tie requirements from the forests immediately tributary to its lines. With the exhaustion of these forests and the conversion of the land to agricultural purposes, the railroads were forced to go further and further away from their lines to secure the needed ties. How far these operations have been extended is little understood, and it is therefore of interest to describe briefly a unique operation carried on in the heart of the Rocky Mountains in Wyoming for the production of ties for a western road.

A Jam

This operation is on the National Forest Reserve and the cutting is carried on in accordance with the regulations of the Forest Service, which by extensive study and observation has developed a policy of selective cutting which will insure the perpetuation of the forest and make possible recurring cutting operations at intervals in the future. The selective cutting policy of the Forest Service may be briefly described as having in mind the following factors:

1. To thin out the stand to give younger trees a chance to grow.
2. To remove all mature and overmature or defective trees.
3. To leave sufficient seed trees for propagation.
4. To leave a cover stand over the entire forest, to protect the soil and retard melting of the snow so that the resulting waters may be utilized for irrigation in the lower country.

In addition, along all roads or trails where fire might be started through carelessness, the brush and limbs are piled as the cutting progresses, and are burned in the early winter after snow comes when there is no danger of spreading fire. Elsewhere in the forest where this danger does not exist the brush is lopped and scattered and under the heavy snow of that region it is soon matted down and forms the humus (of the soil).

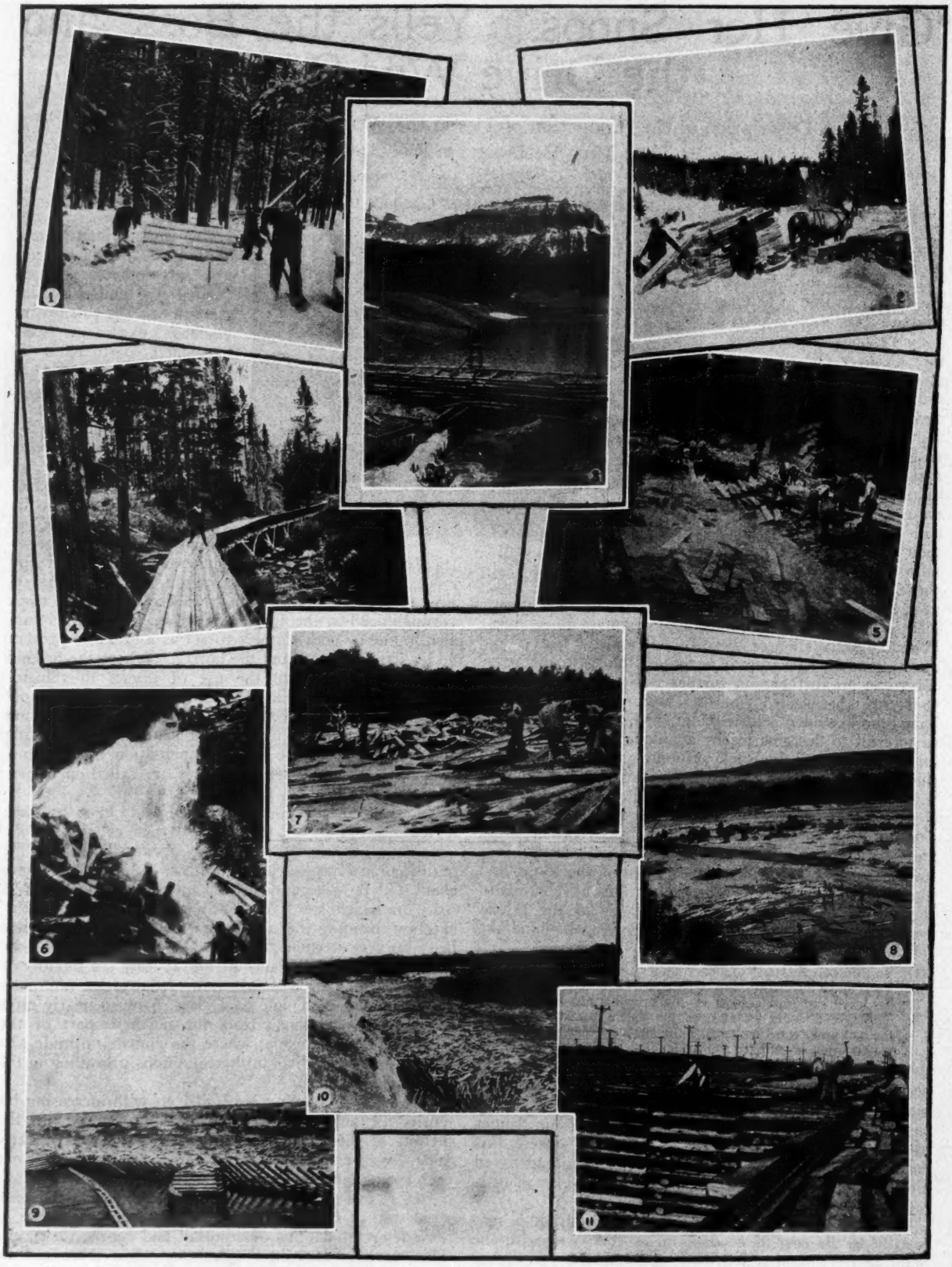
Operation under such regulations naturally adds materially to the cost of production, as compared with the older and common practice of stripping the forest, but it is a satisfaction to know that the forest is left in better shape than its virgin state and that future generations may look to it for its needs. The trees that may be cut are marked by officers of the Forest Service resident on the job and the entire cutting is under their supervision.

The work of cutting and hauling the ties is not unlike any other operation carried on under similar conditions, the many ingenious expedients are developed, particularly to meet the hauling problems in a rough and broken country where the approach to the banking grounds on the streams is frequently very steep. In such places "go devils" are used exclusively—one end of the tie resting on the bunk, in which are imbedded heavy spikes, with the other end dragging, the load being secured to the rig with chain and binder. On a steep slope a "roughlock" in the form of a ⅝ in. link chain is applied to one or both runners to act as a brake to prevent the load from overtaking the horses. Where the ground is too steep to permit the use of horses the "hand-bankers" are called in. These are men of unusual strength and endurance who can both make the tie and carry, drag or haul it on hand sleds to the banking ground, and of course their compensation is commensurate with the increased work they are called on to perform.

As a rule, the choppers' strips are laid out to conform to the topography of the country with relation to the location of the haul roads which generally follow the drainages leading to the main stream. These strips are about 130 ft. wide and in the center the chopper cuts a road on which ties from both sides are piled for inspection, pending the time when the hauling season sets in. Work as strenuous as this, performed at an altitude of 8,000 to 9,000 ft., and during at least six months of each year in 4 to 6 ft. of snow, requires an unusually sturdy type of man; and as a class, none so nearly meet the exactions as those from the northern part of the Scandinavian Peninsula, where the climate, altitude and topography are similar to the conditions prevailing in the Wyoming Rockies.

The work of hauling is carried on with increasing intensity as the time for the drive approaches, with the melting of the snows, the latter part of May and early June, because ties not banked before the drive goes out each spring must be carried over till the following year.

Before one of these mountain streams can be driven a great deal of clearing is necessary to free its channel of ancient accumulations of windfall and debris, rocks, etc. This work is done in the summer when there is little water in the channel. The uncertainty of depending entirely on the natural flow of water can, to a great extent, be overcome by the construction of storage dams at the head of the stream, in which sufficient water can be impounded to push out the drive, in the event natural water



THE CUT AND THE DRIVE

(1) Much timber is left after the cutting has been completed under selective method. (2) "Go-Devil" at the landing. (3) The Storage Dam. (4) The Flume. (5) Breaking landings. (6) A job for the "Powder Monkey." (7) Opening the up-river jam boom when the main drive is started down river. (8) Heavy work for the rear crew on rocky shoals. (9) The jam boom at railroad. (10) The drive in the boom. (11) Yarding the ties.

fails. Some streams are so obstructed with boulders and debris, and with so small a flow of water, that it is necessary to build flumes for transporting the ties to the main river. These flumes are of V type, with 24 in. to 36 in. sides, with a dam at the head to supply an even flow of water on which to float out ties. Where the tributary stand of timber is great enough, this is a safe and economical method of transportation, although the initial cost of construction is high.

The Drive

As the period of driving water in the small mountain streams seldom holds out longer than a week, and frequently is as short as two or three days, everything must be in readiness "to hook" the first water. This means that the crew must be organized and on the job in advance of that hour when the melting snows fill up the channel sufficiently to float ties in large volume and provides the push to carry them past the obstacles that seem to rise up without warning from the creek bed to cause a jam. The drive boss has recourse to all the almanacs and to every sign of nature—when the horses start to shed, or the coyotes to call or the elk to bugle—to help him guess the day he must be ready to go. He plays safe, even though the cost of carrying a crew of a hundred men an extra week or two is no small matter. It is a trying period of waiting on the uncertain. The boss is anxiously watching his snow marks on the surrounding mountains—the direction of the wind, the barometer. The crew is restless; stud palls, moonshine appears, and then when the whole outfit is completely demoralized, the water comes. The boss bellows "All out!" The crew rushes—yes, rushes—to the landings. "Give her snoos!" yells the boss, and the drive is on. The fascination of breaking the landings and seeing them unravel and melt away under the pressure of the water behind would almost make a wooden Indian cry for a pike pole so he could join the game.

The penalty of failure to be ready and on the job, by even a day's delay, might result in hanging the drive in a year when there was scant water. Such a disaster can be insured against by the construction of storage dams described above, and even though they might never be used, they are a safeguard that should not be overlooked.

Downstream, at intervals of ¼ mile or less, are stationed patrols at points where jams are likely to form. When the ties stop running, each man starts upstream to locate the trouble. It may be a plug that can be started with a little picking. If it develops into a jam, a messenger is sent to the breaking crew so that no more ties will be sent down until the stream is cleared. The landing boss must have sound judgment, else he will overload the capacity of the stream.

A jam on a falls or in a canyon where approach to the seat of the trouble is difficult or impossible is a job for the "powder monkey," who is ready with his dynamite when the boss decides it is a job for him. Shooting is not resorted to except where absolutely necessary, as it destroys many ties and is likely to break up the rock walls or bottom of the stream and make cause for other jams.

As the ties are driven from the small side streams they are caught and held in booms, near the mouth, until the passage of the flood water in the main river. At the proper driving stage of water these booms are opened and the main drive started down river.

On this drive the crew, as usual, is divided into two crews, the "head crew" numbering 12 men and boatman, keeping up with the fastest floating ties, and the "rear crew" numbering 70 to 80 men, who clean up the river as they go. The duty of the head crew is to crib up ties and shut off blind channels, sloughs, shoals, etc., so the main drive can be confined to the best channel. The progress of the rear crew depends on many factors—the rise and fall of the river and how fast the change occurs. A quick rise and fall resulting from a cloudburst will leave many ties high and dry a distance away from the channel and these must be carried or dragged back, with great effort. Under favorable conditions the drive will progress two to four miles each day.

To feed a crew of 80 men, when the camp is moved nearly every day, and as far as 75 miles from the base of supplies, requires a well organized supply service. The cooking is all done in the open in "dutch ovens," large, round iron pots with lids which are placed over the fire pit or buried in coals. For moving camp, four four-horse teams are used and supplies are hauled by motor truck. The crew sleeps in tepees or in tarpaulins, in which they roll their beds, and before leaving camp in the morning, when a move is to be made, they roll their outfit so it can be loaded on the wagons.

The total distance of this drive is approximately 140 miles, which is covered in about 90 days.

Yarding

At the railroad the drive is caught in a jam boom strung across the channel of the river, where it is held until the ties can be hoisted and piled in a yard. This work is done by electrically driven conveyors. A main conveyor carries the ties from the river to cross conveyors extending 1,000 feet on either side of the main conveyor. At each intersection of the main conveyor with the cross conveyors is a hopper, into which the different grades are dropped. The ties are then automatically picked up by the cross conveyor and carried to the point where they are to be piled. Piling is done by hand. After a period of seasoning and drying the ties are taken from the pile to the treating plant adjoining the yards, where the preservative is injected. The elapsed time between the cutting of the tie and the completion of the entire operation, when it is ready to be placed in the track, will average about 18 months.

It is a surprising fact and one not appreciated by others than those actually engaged in producing ties, that the methods of production have not been improved since the first ties were made. The cross cut saw, pole ax and broad ax, horse drawn sleighs—the tools of the trade—are practically the same as they were 80 years ago. Portable saw mills have been introduced in some places, but no methods have been developed for the remote sections which are as satisfactory as the old ones.

A Stretch of Well Maintained Track

The Proper Elevation of the Outer Rail

By Charles Weiss

COMMON practice in this country is to equalize the pressure of equipment on both rails, by elevating the outer rail in accordance with the theoretical formula of mechanics for centrifugal force, namely, MV^2/R. This formula has been reduced for various speeds and degrees of curvature, and is found in almost every handbook on the subject. Most authorities recommend that the figure V for speed to be used, should be the maximum that high speed passenger trains are permitted to make over that section of track.

It is believed that the blind and almost universal application of this theory is responsible for many of the deplorable rail conditions so noticeable on the curves of many railroads. This malady of "excessive superelevation" means an annual waste of thousands of tons of rail and contributes in no small degree to many accidents.

In the first place the practice outlined attempts to secure safety for the very extreme and rare condition of highest speed, while the other extreme or even the average condition of ordinary freight trains is ignored. The tractive effort and the corresponding speed is reduced by many factors. The grade, proximity of signals, stations, water towers, fuel stations, and other local characteristics all modify it. Trouble with equipment, congestion on the road and weather conditions decrease the number of trains that might otherwise be included in this small percentage of highest speed trains. Some of the local characteristics may not be known or fully appreciated until operated over for a considerable period. But the fact remains that to get the elevation that is just right for a very few trains, means getting too much difference for the great majority of heavy engines.

In many cases it will be found that instead of being increased, the safety has actually been jeopardized by high elevation. The important point in this connection is uniformity. Without it no track is safe, with it, other conditions being equal, there is no danger of accidents. Derailments occur not because of the amount of elevation, but because of the variation in the average amount over a very short distance, causing cars to rock from side to side until they force themselves off the track.

A further disadvantage of excessive elevation is the cost of maintenance. It is a matter of common knowledge that this figure increases with the degree of curvature. It is equally true that it increases with the amount of elevation. Since most of the trains passing around very much tilted track grind on the lower rail, that rail very soon wears out. There is also some danger of it being turned over. In addition to the rail, the ties and other elements of the track structure being similarly subjected to uneven pressure, are comparatively soon worn out. The cost being higher and the work more difficult, it is but reasonable to expect to find greater variations in the surface as the elevation is increased, so that the deciding factor of safety is unquestionably in favor of low elevation at the curve.

"One of the worst features of excessive elevation is the fact that it tends to increase itself automatically. In other words, if the superelevation to begin with is such that most of the weight bears on the lower rail, it is but a natural consequence for that rail to be hammered down harder into the ballast than the other rail. The original difference is then increased by the amount this rail is so driven down. This rate of change seems to be an accelerating one, accompanied by a deterioration of ballast and pumping joints.

"Short curves are difficult to spiral, especially if of short radius. The change in elevation may become dangerous if the curve is only a few hundred feet long and an attempt is made to raise the outer rail very much. A train of only moderate length will extend onto both tangents, and the distortion caused by the curvature and elevation may cause cars to uncouple or to jump the track. This danger is decreased, while the riding qualities are improved if the superelevation is kept at a minimum value."

The effect on tractive resistance, while slight as a rule, is nevertheless worthy of consideration. This is particularly true in this country, where we superelevate the outer rail entirely, as compared with the European practice of dropping the inner rail and raising the outer rail equal amounts. It means that we are increasing the grade on one rail, and in the case of a maximum tonnage train of slow freight, this may be sufficient in certain extreme cases to either stall the train or to cause the engine to burn the rails. In any case it adds to the resistance of the train and increases the wear on the track.

While admitting that the formula and tables referred to may be well adapted to tracks used solely by one class of trains, such as high class passenger, the writer believes that far better results can be obtained by the use of a few simple rules at the outset, and then to observe the curve under traffic, making corrections that seem desirable. This should be done in any case, but it is thought that fewer changes will be necessary in the method suggested than if the formula be employed. It is, of course, possible to change the formula by introducing certain constants to make it conform to true conditions, but the advantage would be very doubtful.

The practice suggested is as follows:

(1) For freight tracks, where the maximum speed is about 35 miles per hour, elevate the outer rail one-half inch per degree of curvature, with a maximum superelevation of four inches.

(2) For tracks used by both freight and passenger trains, elevate the outer rail two-thirds inch per degree of curvature, with a maximum superelevation of five inches.

(3) For high speed tracks, elevate the outer rail three-fourths inch per degree of curvature, with a maximum elevation of six inches.

Having applied these rules, the track should now be observed for correction in two ways.

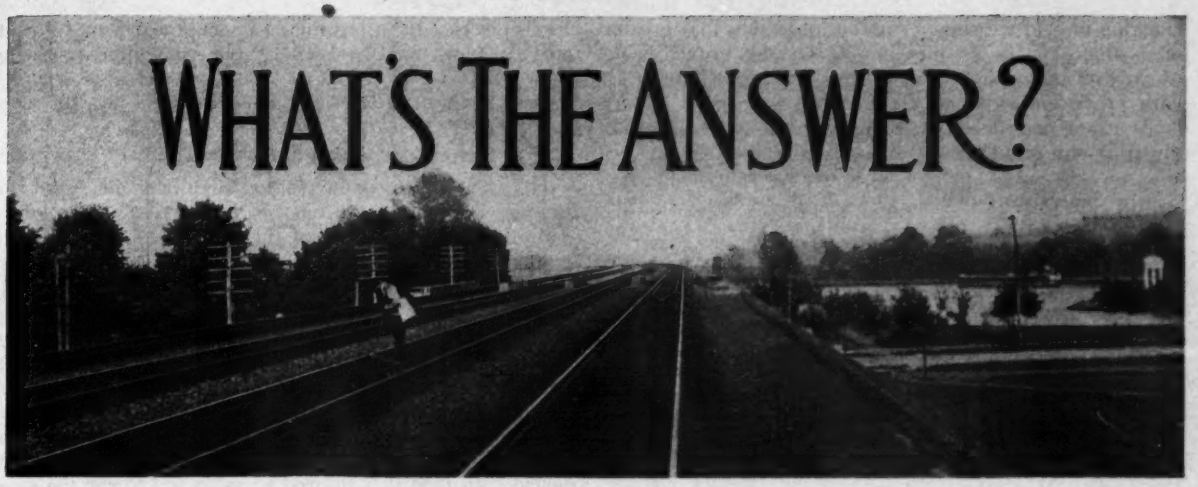
(1) Note how trains ride around the curve. If at normal speed they lurch towards the outer rail the superelevation is insufficient and should be increased. If they grind on the lower side the elevation is excessive and should be reduced.

(2) Observe the wear on the rail. If the head of the high rail shows excessive wear, the elevation is too small and should be increased. If the lower rail is worn most and gives evidence of flattening out and of grinding action, it indicates that the superelevation is excessive and should be reduced.

A matter of equal importance is to properly locate the difference in elevation on the run-off or spiral of the curve. It should conform to the sharpening of the curve, and should be accurately and clearly marked at every change.

Every curve is a problem in itself, and while no formula can be devised to meet all special conditions, it is nevertheless believed that the procedure outlined above will give more economical, safer and simpler results than is obtained by the application of the theoretical formula.

WHAT'S THE ANSWER?



This department is an open forum for the discussion of practical problems of maintenance of way and structures. Readers are urged to send in any questions which arise in their work in the maintenance of tracks, bridges, buildings and water service. The *Railway Maintenance Engineer* also solicits the co-operation of its readers in answering any of the questions listed below.

The following questions will be answered in next month's issue:

(1) What are the three most important factors in good track maintenance, and which of these should be given first attention to secure the most satisfactory results from the others?

(2) Why are tie plates made with a shoulder on the outside only instead of on both sides?

(3) What is the most practical way of taking soundings around trestle bents and bridge piers to guard against scour?

(4) Where wood plank is used between rails at platforms or street crossings, suggest a practicable plan to prevent snow from being packed in the flangeway and then, due to passing wheels, being driven under the first plank, with the result that the plank is forced up above the top of the rail.

(5) How can vermin in bunk cars be killed?

(6) How should paint brushes be cleaned when they are not to be used for some time?

(7) What are the advantages of a roof on a water tank, other than for frost protection?

(8) What rules should govern the installation of a stove in a frost box?

Finding the Frog Number

What is a simple method for determining the number of a frog?

First Answer

There are several methods commonly used by trackmen for determining the number of a frog, all of which are accurate, but in my opinion the simplest method is to draw a line across the point of the frog where it is one inch wide and also where the point is two inches wide. The distance in inches between these two lines is the number of the frog. G. G. AUSTIN,

General Roadmaster, Chicago Junction, Chicago

The above answer was also given by J. M. Morgan and George L. Glover.

Second Answer

The simplest and safest way to find the number of a frog is first to find the theoretical point, which can be done by making a V of your rule and placing the legs alongside the point of frog. Measuring back from the point thus made, if the point of frog is one inch wide, 10 in. back, it is a number 10 frog; if one inch wide, 8 in. back, it is a number 8 frog, etc. A. M. CLOUGH,

Supervisor of Track, New York Central, Batavia, N. Y.

Third Answer

Where you have no rule at hand capable of measuring inches, pick up a stick, or anything that is two or three inches long, and measure across the gage at the point where the stick will just reach the two gage lines, then measure from this point to the theoretical point of the frog with the same stick. The number of lengths of the stick measured in the distance will be the number of the frog. J. M. MORGAN,

Supervisor, Central of Georgia, Goodwater, Ala.

The Proper Pitch For A Tar and Gravel Roof

What is the steepest allowable pitch for a tar and gravel roof?

First Answer

We are building all our tar and gravel roofs with a pitch of ⅝ in. to 1 ft. I would not build them steeper than ¾ in. to the foot and believe that ½ in. to the foot is ample, especially where the roof is liable to become heated by the sun in summer. Only in a case of necessity to give clearance would I build with a ¾-in. pitch.

J. TUTHILL,

Assistant Chief Engineer, Pere Marquette, Detroit, Mich.

Second Answer

The ideal pitch for tar and gravel roofing is from ½ in. to 1 in. per ft. The maximum should not exceed 1½ in. per ft., otherwise the ordinary market tar product is liable to melt and run under the heat of the sun. If the tar is distilled to stand a greater heat than the ordinary market product, it becomes brittle, and is susceptible to

cracking in cold weather. Another objection to a greater pitch than 1½ in. is the liability of the gravel being washed off the roof by violent rains, leaving it bare of all loose gravel and exposing the tar to the sun's rays. There is also to be considered the damage to the gutters, resulting from the gravel being washed down into them.

N. H. La Fountain,
General Supervisor Buildings, Chicago, Milwaukee & St. Paul, Chicago.

Third Answer

My observation has been that the maximum allowable pitch for a tar and gravel roof is 3 in. to the foot, or the so-called fourth pitch. This is as steep a roof as tar and gravel can be placed upon with good results. At a steeper pitch the weight of the gravel will cause the sheets of felt to slip over one another when the temperature is such that the composition between the felt and in which the gravel is embedded becomes soft. If, however, proper precautions are taken a tar and gravel roof can be applied on steeper surfaces with good results by proper nailing of all of the felt, using tin caps under the nail heads and using sufficient rosin or other ingredients in the composition between the felt and in which the gravel is embedded so that it will not soften materially in hot weather. The gravel used under the above conditions should be of a smaller size and only a sufficient amount should be applied so that it may be imbedded in the composition.

Peter Aagaard,
T. S. Leake Construction Co., Chicago.

Linseed Oil, Raw or Boiled?

What are the relative advantages of raw and boiled linseed oil for painting?

There is a difference of opinion on this question among painters. For general use I prefer raw oil for painting or repainting on wood surfaces as it will penetrate and take a better hold on the surface to be painted than boiled oil and will not blister or crack as quickly. I have had a great deal of complaint concerning raw oil and have had the experience myself with paint becoming soft and tacky months after the work was done. However, I believe that the oil was not absolutely pure or perhaps the seed had become sweated or moldy before it was crushed or the trouble may possibly be attributed to the Japan dryer not being of first class quality. When the oil is of first class quality I would prefer it raw. In painting iron or steel I prefer boiled oil, especially for mixing with red lead, on account of the drying qualities and heavy body, as it takes very little Japan dryer in boiled oil to dry it. In speaking of boiled oil I mean oil that has really been boiled, as much of the so-called boiled oil has been boiled with cheap Japan dryer.

H. E. Conrad,
Maintenance of Way Master Painter, Pennsylvania System, Huntingdon, Pa.

The Use of Iron Hooks In Repairing Trestle Bridges

Where staging is used at various heights in repairing a trestle bridge is there any advantage in using iron staging hooks? If so, how are they attached to the bridge deck and how are they adjusted for height?

First Answer

I do not believe there is any advantage in using iron staging hooks. On this division we use a 3 in. by 5 in. pine stick 24 ft. long with a U-bolt in each end, and a 1-in. rope fastened into the U-bolt, which in turn is fastened to the tie or guard rail to swing the staging. For cross pieces for the scaffolding we use 2 in. by 12 in. by 16 ft. pieces. By using the 24-ft. length of 3 in. by 5 in. one can work on two bents at the same time from the same scaffold.

W. H. Brooke,
General Foreman, Bridges and Buildings, St. Louis-San Francisco, Chaffee, Mo.

Second Answer

Hooks may be used by placing them over the guard rail or over the end of the ties on the outside of the guard rail. If used on the end of the ties they should be large enough to slip over the end of ties, with sharp points capable of preventing them from slipping. I prefer the use of hooks on the guard rail, especially from a safety standpoint, and also use U-bolts or triangles and staging boards, using light chains, with a hook on both ends, for raising or lowering the staging. The size of the staging, chains and hooks used should be determined by the weight of the staging and the work to be performed, but for the general use on trestle work a ⅜-in. chain is sufficient. In case it is desired to raise and lower the staging for a double or triple deck trestle, one should use block and tackle with ¾ in. manila rope with double and single steel blocks, which will engage the hooks on both the trestle and the staging boards.

J. P. Anderson,
Assistant Engineer, Nashville, Chattanooga & St. Louis, Atlanta, Ga.

Does Storage Hurt Cement?

Does Portland cement deteriorate in storage when protected from the weather?

This question was the subject of an investigation by the Structural Materials Laboratory at Lewis Institute, Chicago, under the direction of Duff A. Abrams. The conclusions reached were published in bulletin No. 6 issued by the laboratory in June, 1920. Compression tests were made on mortar blocks made with cement which had been stored for various periods in the laboratory, in the basement of the building and in a shed in the yard. The tests indicate that the storing of cement for a considerable period reduced the strength of mortar at the ages of 7 and 28 days, particularly for the cement stored in a temporary shed or in a basement. Thus, for cement stored in a shed the strength of the 7 and 28 days' specimens was reduced to 80 per cent for three months' storage, 71 per cent for six months, 61 per cent for a year and 40 per cent for specimens made of cement stored two years. Tests on older specimens which were tested after a longer period of curing indicate that the strength of the specimens increase with their age. In other words, the effect of storing the cement is to reduce its initial strength or prolong the time of initial and final setting. The results may be summarized by saying that storage tends to weaken it, but by no means destroys its value.

Handling Motor Cars in Emergencies

Do the interests of convenience and safety require foremen to train their gangs to handle the motor or hand car in a certain way, and what is the best method?

First Answer

On single tracks with numerous curves, I would say that one should, by all means, have his men trained to act quickly and in a certain way to remove cars from track in cases of emergency, but let the emergency occur as seldom as possible by properly protecting cars by flag. When necessary to have them on main tracks on long tangents this is not necessary.

The foreman should be the judge of the best method of having the strongest and most active men remove the

car, the smaller or older men getting quickly out of the way, both for their own safety and so as not to interfere with the men who are assigned to lift the car off the track.

A. M. CLOUGH,
Supervisor of Track, New York Central, Batavia, N. Y.

Second Answer

The interest of safety requires that vehicles of any nature for transporting men on tracks should be handled systematically. In the case of motor cars used by section or other gangs, each man should be assigned to a certain place on the car, and no deviation from this rule should be permitted. Should a new man be carried he should assume a place not occupied by one already assigned.

On crooked roads the gang should be given a special drill to train for emergency handling of the car just the same as drilling is done in our schools and elsewhere. This fits each man for the occasion if one should arise requiring quick action in getting the car off the track. The foreman should be and is considered to be the executive of his gang and such training should be given so that whatever orders are given by the foreman to the men in the handling of the car will be carried out by them as a unit.

J. M. MORGAN,
Supervisor and Safety Committeeman, Central of Georgia, Goodwater, Ala.

Third Answer

A certain manufacturer once stated in his advertisement, "Trackmen know the value of seconds." Certainly they should in handling the motor car, for in this work seconds frequently count. It is a wise policy to instruct the gang in handling the car at set-offs and between them where it is necessary to handle the car bodily. It is well to have each man have his own place on the car at all times, but it is also wise to let them shift about at intervals so that should circumstances arise which would force a man from his regular place he would not be at a loss as to proper handling of the car from the new position.

Owing to the many types of cars used on various roads it is hard to determine the best method, but at all times the quickest and strongest men should be kept on the lift end. One suggestion to foremen who have motor cars on high degree and on reverse curves is to keep torpedoes and a red flag handy and have one man drop off to flag as the car proceeds.

GEORGE L. GLOVER,
Road-train Foreman, Michigan Central, Galion, Mich.

Freeze-Proof Water Tank Drains

What is a practical design for a valve control clean-out opening or drain in the base of a water tank that will not freeze in the winter?

A proper answer to this question obviously depends somewhat on the circumstances under which the question arises. One element of design which should be considered in any work of this kind, however, is that of providing for the draining away of all water from the valve if at all possible. The importance of this feature will be evident from the following illustration: In a certain series of elevated tanks used for water softening purposes, the original design of the drainage system consisted of a pipe line extending from the base of the tank to a quick-opening valve near the ground, about 15 ft. below, and thence into the ground a few feet to connect with drainage tile or an open ditch some distance from the tank. With this design of drainage system continual trouble was experienced in the winter from freezing. The trouble was entirely corrected by removing the portion of the line in the ground and arranging it so that the pipe discharged into the open air, as a result of which any water passing through the pipe drained completely away, allowing no ice to form at the opening and work its way back through the standing water into the valve and tank.

As another illustration of the method used for eliminating trouble from this source, the case of a series of tanks located on the ground may be mentioned. In this case, the drainage system consisted of pipes leading from a grillage in the base of the tank to a frost box at one side of the tank in which quick-opening valves were situated. As a result of frequent trouble from freezing in this system, the valves were placed inside of the tank, with the valve rods extended to a point above the water level from which they could be operated. Under this condition the valves themselves could not freeze and whenever opened all water immediately drained away.

Protecting Water Columns in Winter

What is an effective method of protecting water columns from freezing in a climate ranging from 30 deg. above zero to 40 deg, below in winter?

Men who have water columns more or less under their care in cold climates will agree on the importance (1) of providing for immediate and thorough drainage of all water remaining on the discharge side of the water column valve after it has been closed and (2) of providing a substantial box around the valve, a snug fitting cover and the keeping of this cover in place. Ordinarily, the water column is provided with a plug near the base to allow the waste water to drain away, thus leaving nothing to be done in this respect excepting to keep the plug open during the winter and provide a suitable drain line to conduct the water away from the box. The frost box itself should have a false ceiling located a foot or so below the top.

Aside from taking these steps it will usually suffice to hang a lighted lantern or an electric light in the box during very cold weather. The act of opening the box each day to replenish the oil supply in the lantern will let enough fresh air in to replace the air supply required for combustion and the heat from the lantern will do the rest. Stacking manure around the column is not recommended for several reasons.

While discussing the protection of water columns in winter, there is one practice which has been observed in use which should be condemned unequivocally. That is the practice of extending a two or three-inch iron pipe through the frost box for the purpose of providing an opening through which steam from a locomotive can be discharged when necessary to thaw out the water column. In the first place, the water column should not be allowed to freeze, in the second place, the use of steam under such conditions is usually a poor method of thawing out the system, and in the third place, the presence of such a pipe really operates to destroy the insulating effect of the wooden box by permitting the conductance of the cold temperature through it. Aside from these points, it should also be stated in this connection that enginemen should be impressed with the importance of preventing slop-overs when filling engine tenders because of the accumulation of ice and water around the water column, the seepage of which through the ground has an invariable tendency to increase the likelihood of the water column's freezing, as well as greatly to increase the difficulty of opening the box for regular inspection.

CORRECTION—In the answer on clogged sewers, by E. M. Grime, published in the February issue, reference was made to manholes or other openings at intervals of 30 ft. Mr. Grime advises that this should have been 300 ft.

Making One Dollar Do the Work of Two

Hints That Help

Ways That Win

Cleaning Sand Out of Wells

By Dennison Fairchild

Supervisor, Bridges and Buildings, Northern Pacific, Duluth, Minn.

THE METHOD of getting sand out of deep wells, described below, occurred to me after observing air lift pumps and may be new to some.

A well with an eight-inch casing, 145 ft. deep (from which about 100,000 gal. of water was pumped daily), became clogged with sand to such an extent that it practically stopped the flow. A test developed 14 ft. of sand and small gravel. We inserted a ¾-in. pipe to the sand and forced air to the bottom, the rising bubbles keeping the water disturbed and the sand in suspension, so that it was thrown out very quickly and at less expense than by any other way I have ever tried.

In another case we had a well 236 ft. deep with an eight-inch casing where the sand was beginning to shut off the supply and get into the pump. We had only 150 ft. of ½-in. pipe, which we connected up with an engine. The rising air created enough disturbance to lift the sand and the water was running clear and free of sand at the end of 25 min.

Plaster Casts Show Extent of Bridge Member Corrosion

By O. T. Leavenworth

Bridge Engineer's Office, Chicago, Rock Island & Pacific, Chicago

THE INVESTIGATION of old bridges frequently makes it necessary to record the extent of corrosion of bridge members for which purpose the usual custom is to caliper the members at sufficient points to determine the amount of metal remaining. Because of the difficulty of using calipers for this work on a certain structure, the idea of making plaster of paris casts of the members was suggested and the ease of application and absolute accuracy of this method suggests its extended use. One particular advantage of the method in this case was derived from the readiness with which it was possible to demonstrate to the executive officers of the railroad how serious the corrosion had become

The characteristics of plaster of paris are well known. It is cheap, can be purchased anywhere and when mixed with water it will flow into any crevice, will stick to any surface, hardens quickly and can be cut with a knife or sawed. The easiest method of taking impressions is as follows: After removing all rust and paint and mixing the plaster of paris in a quart can, it is applied to the beam with a small flat stick used for mixing, gradually building up about an inch of plaster of paris. After hardening about 30 min. the cast is broken off with a cold chisel and hammer. The breaks are then plastered together with additional material outside and the whole section built up heavier.

Such plaster casts are used most conveniently when prepared in short sections or lamina one inch in thickness and with planes perpendicular to the axis of the bridge member. This will give a perfect contour of the member from which the moment of inertia may be calculated.

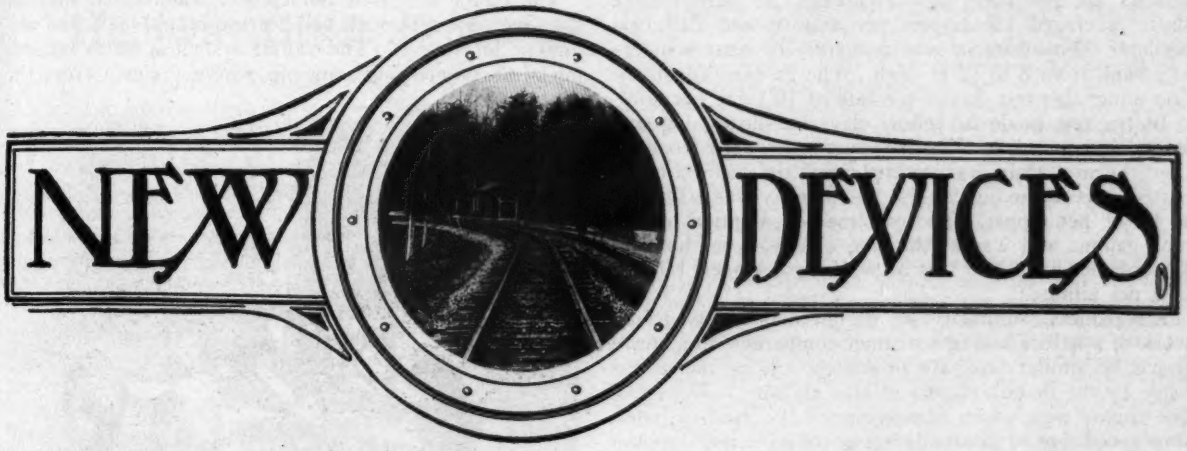
For the purpose of sawing the cast should be secured in a mitre box, by bedding it into the box with plaster

Three Casts of One Flange of an I-Beam. The One at the Left Shows the Full Section, the Two at the Right Show Badly Corroded Sections

of paris grout and then sawed with a hack saw. In mounting the cast in the box it is necessary to be very careful to see that the cast is placed so that it will be sawed normal to the plane of the beam. The completed casts will be found light, hard and strong enough to withstand reasonable handling.

Stopping Gasoline Leaks

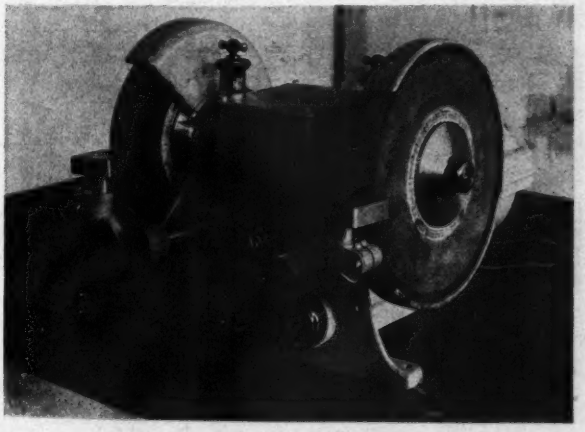
THE following method of stopping the leakage of gasoline through narrow cracks or around valve seats was suggested by the chief inspector of the Bureau of Explosives, speaking before the Committee on Freight Claims Prevention of the A. R. A. "The use of oatmeal might be effective where there is leakage of gasoline through a narrow crack or around a valve seat. Oatmeal may be considered a reasonably good substance due to the fact that the material is rolled or crushed and not ground into a fine powder. The effectiveness of the method will depend upon the size and shape of the opening. It has also been suggested that plaster of Paris mixed to a plastic mass with water might be rammed down over the point of leakage from inside or outside, as may be most convenient. This will set hard in a few minutes."



Portable Electric Drill and Grinder

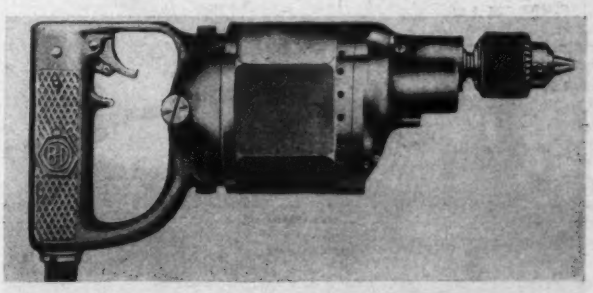
THE BLACK & Decker Manufacturing Company, Baltimore, Md., has recently added to its line of equipment adapted to railway use, a portable quarter-inch drill and an electric bench grinder. As with the other drilling equipment manufactured by the Black & Decker Company, this drill is of the "pistol grip and trigger switch" type, which makes it particularly adapted for close quarter drilling (in this case within about an inch of an obstruction), but it embodies the feature of being especially designed for quarter-inch work. Aside from being compact, the drill has the additional feature of lightness, its weight being 5 lb., and it is so arranged as to make all parts of the mechanism easily accessible. The housing is of aluminum alloy and the gearing is of a stub tooth type in double reduction arrangement, which gives a no-load speed of 1600 r. p. m. While intended especially for drilling, the company has also adapted the device for use as a grinding tool, additional equipment for this purpose consisting of a base which may be clamped to a bench, and an emery wheel which may be attached to the drill spindle just back of the drill chuck.

The bench grinder as recently developed by the company is a two-wheel device which is operated by a self-



The Eight-Inch Electric Bench Grinder

contained three-quarter hp. motor similar in type to the motor used in the company's line of portable electric drills, these motors operating on alternating and direct current at will. Among the prominent features of this device is the arrangement of the grinding wheels which are set well forward in the motor casing and located so that they overhang the bench, by reason of which it is possible to grind long pieces and odd shapes with facility and to wear the grinding wheels down to the clamp washer. The motor itself is air-cooled and arranged so



The New Quarter-Inch Drill

that the air cooling intake is located 12 in. from the grinding wheels in order to reduce the tendency of grit to enter the machine. This machine complete includes one 8 in. coarse and one 8 in. fine grinding wheel, each having a ¾-in. face, also two wheel guards, two adjustable tool racks and an electric cable with attachment plug and switch.

A New Gasoline Operated Shovel

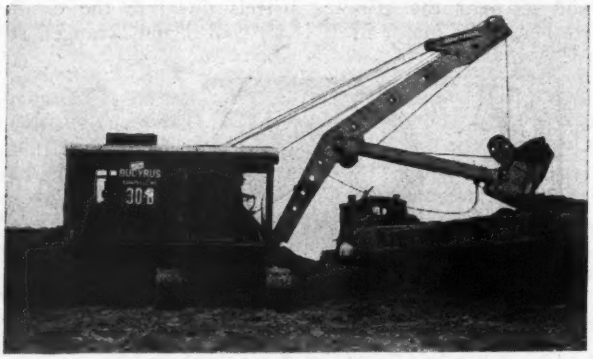
THE WIDESPREAD tendency of manufacturers of excavating machinery to adapt themselves to a period characterized by the popularity of internal combustion engines for power purposes is manifested in the recent developments of a gasoline power shovel by the Bucyrus Company, South Milwaukee, Wis. This machine is a one yard revolving shovel of the caterpillar type, known as Model 30-B. The machine itself has been the object of study extending over a number of years, during which the chief problems requiring solution have been those of obtaining effective transmission of gasoline power for thrusting movements without excessive complications in design and obtaining a digging power comparable with that of a steam engine of similar size. These problems, it appears, have been met satisfactorily.

Prior to its introduction on the market the shovel was used for a period of six months for casting and for loading sticky clay, for grading a road carrying 5½ in. macadam, and for stripping a stone quarry of stiff hardpan. During a 4¼ hour continuous test made in stripping the quarry, the material moved was estimated at ¾ yd. per dipper. The output averaged 44 yd. per hour in loading

and 71 yd. per hour in overcasting. In loading, the shovel averaged 1.7 dippers per minute, and 29.3 cars per hour. This material was hardpan with many boulders in a bank from 8 to 12 ft. high. The gasoline consumption under this test was at the rate of 10.1 gal. per hour.

In the test made in yellow clay the shovel dug and loaded 160 cu. yd. in 1 hr. 16½ min., measured from the time the first train was spotted until the last train departed. As in the quarry test the quantity was estimated at ¾ yd. per dipper. The gasoline consumption totaled nine gallons and was at the rate of 7 gal. per hour or 17.8 yd. per gal. The rate of working averaged 1.9 dippers per minute.

Ruggedness, simplicity of design and ability to do work of a nature and in a manner comparable to a steam shovel of similar size, are prominent among the claims made by the manufacturers of this machine. The gasoline engine with which it is equipped is a four-cylinder, slow speed type of unusually heavy construction, developing 55 hp. at a speed of 400 revolutions per minute. As will be seen in the illustration the shovel is entirely enclosed. The traction speed of the shovel is about 0.4



The New Gasoline Power Shovel

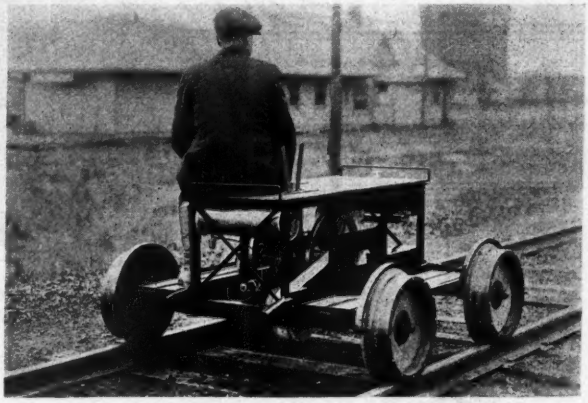
miles per hour, the maximum dumping height with the boom at its standard angle of 47 deg. is 15½ ft. above ground level and the approximate weight of the machine with the caterpillar tread is 5,400 lb.

The machine has no engine motor, shaft, chains or gears on the boom, nor any telescopic shafting to increase the amount of maintenance required of such equipment and may be converted into a dragline crane or clam shell by changes easily made in the field. The machine is also adapted to a substitution of a truck for its traveling on rails in place of the caterpillar tread. Like other gasoline-operated excavating machinery, its advantage lies particularly in districts where either coal or water or both are expensive or not of a suitable quality for economical operation.

A New Light Weight Motor Car

THE Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn., is now introducing a new design of one-man motor car to which it has given the trade name, Safety-Quick. This car is of the center load type with a capacity for four persons, seated, and a weight of but 385 lb., by reason of which it can be used as a gang car and yet permit of its handling by one man. For this purpose handles are provided at each end. As will be seen in the accompanying illustration, the comparative lightness of the car arises both from the small size of the unit and the construction, the body consisting of an effectively reinforced steel frame, an unusually light weight platform and small wood disc wheels.

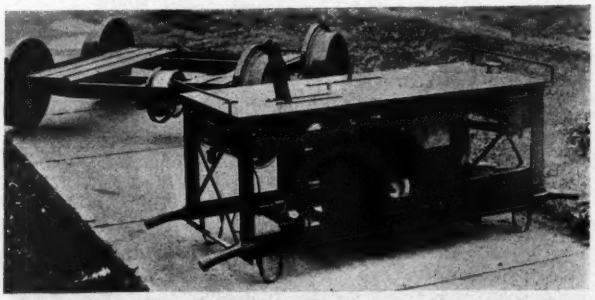
The motor is a four horsepower watercooled unit of the reversible type with ball-bearing crank shaft and automatic lubrication. The cooling system operates according to the condensing principle, whereby steam from the



A Side View of the "Safety Quick" Motor Car

water jacket of the motor circulates through a radiator situated well up on the front end of the car and returns to the engine in condensed form. This system, aside from keeping the motor working at its highest efficiency, reduces the inconvenience arising from frequent refilling (less than a cupful of water being consumed in a 500-mile trip) and constitutes one of the factors promoting lightness in weight, by reason of the fact that less than one gallon of water is required for cooling purposes.

The car is adapted for either battery and coil or high tension magneto ignition, the magneto, when applied, being completely enclosed and running in oil. The carburetor may be controlled and adjusted from the seat board while the machine is running. As with all Fairmont cars, this model is equipped with a belt drive, but unlike previous models the belt on this car is kept at constant tension by means of two adjustable springs, the tension being just sufficient to propel the car, and the springs performing the additional function of absorbing vibration. The motor is started by means of a two-way "safety" crank and obtains its fuel supply from a copper



"Safety Quick" Car in the Knockdown Position

fuel tank of three gallons' capacity, supported at one end of the housing of the car.

Three additional points of interest in connection with this car are the knock-down feature of construction whereby the power unit may readily be separated from the truck for baggage shipment; the spring mounting of the power unit by reason of which bumping or vibrating of the car during motion is absorbed effectively; and the safety guards on all four wheels. The car can start with a capacity load, it being necessary only to start the engine.

The Proper Protection of Highway Grade Crossings*

By F. M. Metcalfe

Assistant to General Manager, Northern Pacific, St. Paul, Minn.

THE BARBER-POLE or zebra-striped aspect of our present gates is a big improvement visually upon the former plain white painted arms that were in general use, and as protection to the users of crossings, these gates should be ample. Of course, we all know that they do not furnish absolute protection, as some foot passengers crawl under them and some automobile drivers crash through them, but to make crossing gates foolproof would not be practicable.

The operation of these gates, however, is often subject to improvement. It is the general custom of railroads to fail to display necessary warning notices when gates are not in working order and when gates are not being operated due to the gatemen not being on duty during all of the 24-hr. period of each day, and this is bound to be confusing to drivers of vehicles from the fact that the gates under those circumstances give a "clear" indication. The public has no means of knowing when a gate is standing vertically that it is in a defective condition or that there is no gateman on duty and therefore considers it safe to proceed. Train, engine and yard men, too, do not always know that a certain gate is not in operation and they therefore cannot be expected to proceed as cautiously over the crossing as they otherwise might. My opinion is that in these circumstances we should have a uniform method of warning the public and of notifying employees concerned. Ordinarily when a gate is out of order the gateman takes a position on the ground to do his flagging, but it is not infrequent for one gateman to operate gates from one tower for two or more crossings. Under those conditions a flagman should invariably be assigned specifically to protect the crossing in question.

Occasionally accidents occur from gates being lowered directly upon moving vehicles, because the gateman is so located that he cannot see what is in the pathway of the gates on each side of the tracks when he begins to lower them. This, too, is a feature susceptible of improvement.

The next item is distant signs. This class of sign has been made nationally uniform by the A. R. A. Grade Crossing committee, but I think it is extremely inadequate and unintelligible for the very important function it is intended to serve. It is a white painted disc about 20 in. in diameter with a cross and the letters R. R. in black upon it, with one R on each side of the vertical line of the cross. It is supposed to represent to the public a railroad crossing, but it does not, and to my mind it represents a waste of a lot of money which it took to make and erect these signs.

The distance at which this A. R. A. sign is required to be placed from the obscure crossing is 300 ft. instead of 400, as formerly required. An automobile moving at 25 miles per hour travels over 100 ft. of ground in three seconds. At this very conservative speed we give the driver but 9 seconds in which to take the necessary advance precautions. At a speed of 40 miles per hour the sign gives but five seconds warning.

The following are some rules for the guidance of highway crossing watchmen and gatemen which have been adopted by the Northern Pacific as standard:

1. Crossing watchmen and gatemen will report to and receive instructions from section foremen and must not absent themselves from duty until relieved by employees assigned to do so, or, in cases where but one shift is worked, until their assigned hours on duty have expired. During hours on duty watchmen must keep a vigilant lookout for all trains and engines and, when they approach, warn persons coming toward the track and prevent their crossing until it is safe to do so.

2. Crossing watchmen and gatemen must provide themselves with proper appliances for doing their work and keep them in good order and ready for immediate use.

The signal equipment for each watchman will be: (a) A regulation STOP disc, (b) a standard crossing watchmen's red lantern which has sides shielded and light showing both back and front, and (c) a red flag. The signal equipment for each gateman will be the same as for watchmen except that in addition he will provide himself with two standard gate lanterns which have sides shielded and a red light showing in the one direction of approaching highway traffic.

3. When a train is approaching watchmen must place themselves in the middle of the highway, near the track and by day will display the STOP disc, holding it in an upright position so that the flat side will appear plainly to any person approaching on the highway. By night, or when the STOP disc cannot be seen plainly, they will take the same position and protect the crossing with a standard red lantern with the light displayed toward the highway in both directions, care being used not to show the red light in the direction of the track. When there are two or more tracks, the watchmen will, when practicable, take a position near the track, opposite from the one on which the train is approaching, where they can best protect the public from trains approaching on other tracks. Crossing watchmen will, under no circumstances, signal by hand or otherwise for highway vehicles to cross the track. In case it should be necessary to stop a train or engine, a red flag should be swung across the track by day and a red light by night.

4. Where gates are provided, a crossing lamp will be attached at night to each pair of gate arms by the gatemen, showing "Red" toward the highway and no light toward the track. Gates must be lowered completely on both sides of the track in ample time before the approaching train or engine reaches the crossing, and must be kept lowered until the train or engine has passed and until it is known that no other train or engine is approaching. When the gates are, for any reason, out of order, the gatemen must protect the crossing in the same manner as crossings are protected that are not provided with gates. (See Rule 3.)

5. When a train is switching over a crossing or in case a train has stopped and is cut so as to avoid blocking the crossing, watchmen must be especially careful and co-operate with the train crew in the safe movement of persons and vehicles over the track.

6. In case of accidents, watchmen or gatemen must endeavor to obtain the names and addresses of persons injured and of as many witnesses as possible; also obtain the license number on the vehicles involved and the name of the state which issued the license. This information should be promptly given to the foreman to whom the watchman or gateman reports. They should also report to him any defect they may observe in the crossing or its approaches which might cause an accident.

7. In order that the watchmen's or gatemen's attention to duty may not be diverted, visitors and unauthorized persons are not permitted to enter and loiter about cabins and towers, and the reading of books, papers or periodicals is not allowed.

Another feature connected with this subject which is worthy of mention is the quality of labor employed in this branch of service. Circumstance and custom have combined in many cases to place on our crossings for the protection of the public, men who are physically and mentally unfit to perform other service. The big majority of these men have lost their ability or facilities through age or accident, yet they are apparently considered fit to guard the life and limb of the public even though they often are not qualified to guard their own. A movement should be begun to improve the standard of crossing watchmen and flagmen.

*Abstracted from a paper presented before the Tenth Annual Congress of the National Safety Council at Boston, Mass.,

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The Growth of Motor Trucks—From 1915 to 1920 the number of motor trucks in Massachusetts has increased from 12,053 to 52,968, while in Rhode Island the number has increased from 1,629 in 1916 to 9,768 in 1920. At the present time the business in New England is such that most truck operators are limiting haulage rates to whatever the traffic will bear, as a result of which the competition with the railroads for the transportation business is particularly keen and requires the railroads affected to devote special attention to meeting it.

American Railway Engineering Association

Plans are well in hand for the twenty-third annual convention of the American Railway Engineering Association, which will be held at the Congress Hotel, Chicago, March 14, 15 and 16. Most of the committee reports have already been printed and distributed to the members, while bulletins containing the remainder of the reports will be issued during the next ten days. An unusually large attendance is expected. All indications point to a successful exhibit of the National Railway Appliances Association, which will be held the same week at the Coliseum, as outlined on a preceding page.

The program for the A. R. E. A. convention is as follows:

TUESDAY, MARCH 14

President's address.
Reports of secretary and treasurer.
Reports of committees:
- Yards and Terminals.
- Electricity.
- Ballast.
- Iron and Steel Structures.
- Standardization.
- Signals and Interlocking.
- Ties.
- Track.

WEDNESDAY, MARCH 15

Reports of committees:
- Shops and Locomotive Terminals.
- Roadway.
- Economics of Railway Location.
- Stresses in Railroad Track.
- Records and Accounts.
- Signs, Fences and Crossings.
- Water Service.
- Uniform General Contract Forms.

Annual Dinner at 6:30 p. m.

THURSDAY, MARCH 16

Reports of Committees:
- Masonry.
- Rail.
- Economics of Railway Labor.
- Wooden Bridges and Trestles.
- Economics of Railway Operation.
- Buildings.
- Wood Preservation.
- Rules and Organization.

Memorial Meeting—John Findley Wallace.
New business.
Election and installation of officers.

FRIDAY, MARCH 17

Excursion to Gary Industrial District.

Bridge and Building Association

Reports from the Bridge and Building Association indicate continued progress of a very satisfactory nature on the part of the several committees in preparing reports for the next convention. To date it is estimated that the work of the committees is about 40 per cent completed, with one report practically ready for its first reading. The second bulletin concerning the affairs of the association, which has just been issued, is devoted entirely to committee work, including a resume of the work done and the progress made by each committee. Those reports which show the most progress are those on Labor Saving Devices in Routine Bridge and Building Work; the Relative Merits of Wood, Steel and Concrete Tanks; Framing Bridge Timbers Before Treatment, and Handling and Driving Concrete Piling. During the month one change has been made in the personnel of the committees, J. M. Buckingham, master carpenter, Chicago & Eastern Illinois, being appointed chairman of the Committee on Building Inspection and Records in the place of F. H. Soothill, Illinois Central, resigned.

American Association of Engineers

The American Association of Engineers will hold its fourth annual railroad conference in Chicago on Monday, March 13, the day preceding the opening of the annual convention of the American Railway Engineering Association.

Roadmasters' Association

The executive committee will meet at the Auditorium hotel at 9:30, March 15. The chairmen and members of the various committees are invited to join in a luncheon at 12:30, after which the afternoon will be devoted to the consideration of the tentative reports on which the committees are now at work.

Maintenance of Way Club of Chicago

The fourth meeting of the Maintenance of Way Club of Chicago was held at the Auditorium Hotel, Chicago, on February 15, with an attendance of 60. E. D. Swift, engineer maintenance of way of the Belt Railway of Chicago, presented a paper on The Maintenance of Railway Crossings, which was followed by a spirited discussion. The meeting was preceded by a get-together dinner in the dining room of the hotel.

International Track Supervisors' Club

The International Track Supervisors' Club held a meeting at the Statler hotel, Buffalo, N. Y., on Feb. 18, 1922, with an attendance of 18. Snow Protection was the subject for the evening and two papers were presented. One by J. D. Saulsbury, Supervisor New York Central, Charlotte, N. Y., covered "Snow Fences and Snow Protection." Another by E. P. Safford, Supervisor New York Central, Silver Creek, N. Y., related to "Snow Protection by Trees." The discussion of these papers brought out comment on other matters relating to snow fighting. Five applicants were made members.

Maintenance Employees' Opportunity to Save Coal

IN AN ARTICLE in the Illinois Central Magazine for October, 1921, A. F. Blaess, engineer maintenance of way, emphasizes the importance of the conservation of fuel on the part of every employee and points out a number of ways in which maintenance of way men may co-operate in this campaign. After stating that the Illinois Central consumes ten tons of coal per minute and that the cost of fuel on this one road alone was $17,832,958 in 1920, or 11.2 per cent of the total operating expenses, Mr. Blaess goes on to say that the supervisor can save coal by planning the work of his gangs as far in advance as practicable to require the least number of slow orders, by being posted at all times on the number of slow orders on his district and handling them in such a manner as to know that they are removed promptly when necessity for them no longer exists, by using work trains only when absolutely necessary and watching their performance closely, by fully advising the conductor of a

work train before he starts out what and where he is expected to work to make possible the doing of the work with the least number of delays and the least number of moves, by not listing work trains any longer in advance of the time the work will start than necessary and by releasing them promptly when the work is completed.

The section and bridge foremen can save coal by keeping the number of slow orders as low as consistent with safe and economical operation, bearing in mind that safety must be the first consideration and, where work is being performed that will prevent the safe handling of trains at scheduled speed, the trains should be protected by proper signals, and where caution signals are used the necessity for them should be removed as quickly as possible and slow orders taken down. Slowing down or stopping trains not only means the increased use of coal in many cases by the trains stopped, but frequently disturbs the movement of other trains with which meeting points have been arranged, consequently causing an increased use of coal by these other delayed trains as well.

Open coal fires are frequently made at cinder pits, in the vicinity of water columns and elsewhere where it is necessary for men to work outdoors during the winter months. Often these fires are maintained day and night for weeks, and they may consume a ton or more of coal a day. These fires should be eliminated wherever possible. Where they are absolutely necessary, they should be confined to a salamander, sheet steel stove or similar device that will provide more useful heat with less discomfort to the men and with a great deal less coal.

Boilers at pumping stations should be washed out at regular intervals. Particular attention must be given to the crown sheet and water leg, removing all mud and loose scale. The length of time between washouts will depend upon the character of the water and the hours the boiler is under steam. With the same conditions as to service and quality of water, a boiler under steam 20 hours a day should be washed twice as often as one under steam 10 hours a day. Soot and ashes should be cleaned from all heating surfaces. Tubes should be kept clean, either by running a tube cleaner through them or blowing them out with dry steam.

Grates must be kept in good shape; burned out or broken grates permit coal to waste into the ashpit and allow surplus air to enter the firebox, causing holes in the fire and forming clinkers. A level, bright fire should be maintained; banks and holes in the fire cause clinkers and an excess of fuel consumption. Large lumps of coal should be broken up. The coal should be fired in small amounts and at regular intervals, as large amounts cut off the air required for combustion or cause it to enter the firebox in uneven quantities, with a resultant poor combustion and loss of fuel. Screenings as a rule should be fired more lightly than lump or mine run, and if properly handled will give good results. Injectors should be used to feed the boiler at as nearly a uniform rate as possible and should not be used when cleaning fires or when the fire is low, if possible to avoid it. Boilers should be blown off as often as necessary to prevent an accumulation of mud. To prevent foaming the blow-off valve should not be opened while the pump is running or while the injector is on. It is preferable to blow off while the pressure on the boiler is low enough to avoid loss of fuel and undue strains on the boiler.

Coal should not be unloaded at pumping stations in excess of a reasonable supply, preferably not to exceed one for 60 days, on account of the excessive loss in storage. Coal should be piled so that it will not become scattered or inaccessible. Waste, pieces of wood or other easily combustible material should not be permitted to remain in coal piles, as they encourage spontaneous combustion.

The Material Market

THAT THE iron and steel business is on a thoroughly competitive basis is evident from the general trend of prices. The current quotations for track spikes, bolts and tie plates in the Chicago market are lower than they were a month ago. The wire market is also in an uncertain condition, there being persistent rumors of a definite reduction in prices by the manufacturers. This has not yet been announced, but in the meantime there has been a weakening in the quotations, particularly for large orders. Cast iron pipe is also lower than a month ago and there has been a further gradual decline in the prices of structural steel shapes, plates and bars. With respect to these items it is of particular interest to observe the gradual decrease in the differential between Chicago and Pittsburgh prices. With the Pittsburgh base definitely in effect, there would be a difference of 38 cents per 100 lb. between quotations at the two points, but this is now down to 10 cents and for large orders it is even lower. Thus the plates and shapes for a recent order for cars was placed at 1.40 cents Chicago.

	Prices in Cents Per Pound			
	January 20		February	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes	$2.15 to $2.20	$2.53 to $2.63	$2.15 to $2.20	$.... $2.48
Track bolts	3.00 to 3.25	3.58 to 3.63	3.00 to 3.25	3.38 to 3.48
Angle bars	.... 2.40	.... 2.40	.... 2.40	.... 2.40
Tie plates, steel	.... 2.00	1.88 to 2.00	.... 2.00	.... 1.75
Tie plates, iron	....	1.88 to 2.00	....	.... 1.75
Plain wire	.... 2.25	.... 2.63	2.15 to 2.25	2.53 to 2.63
Wire nails	.... 2.50	.... 2.88	2.40 to 2.50	2.78 to 2.88
Barbed wire, gal.	.... 3.15	.... 3.53	3.00 to 3.15	3.38 to 3.53
C. I. pipe, 6 in. or larger, per ton	....	.... 44.10	....	.... 42.60
Plates	1.40 to 1.50	1.60 to 1.75	1.40 to 1.50	1.55 to 1.60
Shapes	1.50 to 1.60	1.50 to 1.75	1.40 to 1.50	1.55 to 1.60
Bars	1.50 to 1.60	1.60 to 1.70	1.40 to 1.50	1.55 to 1.60

The scrap market shows but little variation as compared with last month, the principal difference being a decline in the quotations for relaying rail.

	Prices Per Gross Ton at Chicago	
	January 20	February
Relaying rails	$23.00 to $27.50	$20.00 to $25.00
Rerolling rails	12.00 to 12.50	12.00 to 12.50
Rails less than 3 ft. long	12.50 to 13.00	12.50 to 13.00
Frogs and switches cut apart	11.50 to 12.00	11.25 to 11.75
	Per Net Ton	
No. 1 railroad wrought	10.50 to 11.00	10.50 to 11.00
Steel angle bars	10.50 to 11.00	10.50 to 11.00

The lumber market shows little variation from previous months. In the case of Southern pine there has been an appreciable falling off of the prices so that there has been a distinct reduction since the end of 1921. With Douglas fir the prices are distinctly firm, a definite reflection of the fact that production, shipments and orders during the past four weeks are distinctly above those for the previous month.

Southern Mill Prices	January	February
Flooring, 1x4, B. and B. flat	$44.50	$45.15
Boards, 1x8, 14 and 16, No. 1	26.45	29.90
Dimension, 2x4, 16, No. 1	22.60	21.75
Dimension, 2x10, 16, No. 1, common	22 90	18.65
Timbers, 4x4 to 8x8, No. 1	20.15	18.75
Timbers, 3x12 to 12x12, No. 1	25.55	21.85
Douglas Fir Mill Prices		
Flooring, 1x4, No. 2, clear, flat	30.00	29.00
Boards, 1x6, 6 to 20, No. 1, common	11.00	11.00
Dimension, 2x4, 16, No. 1, common	13.50	12.50
Dimension, 2x10, 16, No. 1, common	13.50	12.50
Timbers, 6x6 to 8x8, No. 1, common	15.00	15.00
Timbers, 10x10 to 12x12, rough	15.00	15.00

A new table of Portland cement prices recently issued shows a few minor adjustments in the prices of the various cities of the middle west. As a consequence of agitation on the part of middle west state highway commissions against the prices of Portland cement there have been rumors of a definite reduction, but so far this has not materialized. The following are prices per barrel in carload lots, not including package:

Pittsburgh	$2.02	Milwaukee	$2.13
Detroit	2.17	Minneapolis	2.24
Chicago	1.94	Davenport	2.06
Duluth	1.95	Cincinnati	2.32

General News

The Engineering Division of the American Railway Association recently became a member body of the American Engineering Standards Committee.

An attempt was made to wreck the southbound Shore Line Limited of the Southern Pacific at Glendale, Calif., on the night of January 27, by the efforts of a former switchman of the road to nail an obstruction upon the track prior to the train's arrival. The man was shot.

The Interstate Commerce Commission's summary of wage statistics for October indicates an increase of 35,806 in the number of employees as of the middle of the month compared with September. The total compensation increased $12,630,137, making a total of $237,602,959 for a total of 1,754,736 employees.

Eleven employees of the New York Central arrested last September on charges of theft of goods from freight cars were convicted of receiving stolen goods in the Supreme Court at White Plains, N. Y., and fined amounts from $100 to $300 each with the alternative of serving jail sentences if the fines were not paid.

Tentative valuations have been served by the Interstate Commerce Commission on a total of 184 properties up to December 31, 1921. Owing to the fact that most of these are small roads, few being over 1,000 miles long, the total mileage involved is only 26,191, which is less than 10 per cent of the total mileage of railroads in the United States.

Employees of the Southern Pacific general shops at Sacramento, Calif., boast a 38 piece band and a glee club of 48 voices which have been developed at the shop since 1917, when the two clubs were organized. Since that time the two organizations have raised over $14,000 for charitable purposes, have built up a music library valued at over $3,000 and have equipped themselves with uniforms.

The Pennsylvania Railroad, looking for revenue from all practicable sources, has decided to sell advertising space in some of its passenger cars and ferry boats, the coaches being those operated in electric service out of Broad street station and between Camden and Atlantic City and the ferry boats being operated between Philadelphia and Camden and between New Jersey cities and New York.

Pursuant to an order served upon 49 railroads by the Interstate Commerce Commission on January 10 to show cause by March 15 why the commission should not require them to install by July 1, 1924, between designated points on their main line, automatic train stop or train control devices, representatives of all but three or four of the roads cited met in Chicago, February 14, and organized a committee of nine members to represent the roads in this manner.

Secretary of Commerce Herbert Hoover, in statements made before the Interstate Commerce Commission on February 3, 1922, said in reference to the importance to the nation of rehabilitating the American railroads that a billion dollars spent upon American railways would give more employment to the people, more advance to the industry and more assistance to the farmers, than twice that sum expended outside the frontiers of the United States, as has been suggested by various organizations as a means of increasing farm exports.

Landslides in Cajon pass, Calif., and heavy snow slips in the vicinity of Dillon, Colo., on February 22, held up train operation on the Atchison, Topeka & Santa Fe and the Colorado & Southern, respectively. One of the slips near Dillon covered the tracks with 15 ft. of snow for a distance of 215 ft. The west-bound track of the Santa Fe between Cajon and Summit for an eighth of a mile was covered in some places to a depth of 30 ft.

The decrease in passenger traffic in Pullman cars since the application of the surcharge on Pullman car fares made in 1920 has resulted in a reduction of revenue to the Pullman Company of about $1,000,000 a month, through the average reduction in the number of revenue passengers of 600,000 a month. The average distance traveled by passengers in Pullman cars is over 360 miles, year by year, or nearly ten times the average distance traveled by all passengers on all roads.

Committees of both the House and the Senate have reported favorably the bill to strike out of the Federal Valuation Act the requirement that the Interstate Commerce Commission should be required to report the excess cost of acquisition of land and the debate on the bill was begun in the Senate on February 21, where it was made the unfinished business and was passed on Feb. 23. This amendment has been sponsored and supported by the Interstate Commerce Commission and the state commissions.

In a bulletin issued by the Presidents' Conference Committee on Federal Valuation, a total of $11,480,923 was reported to have been expended for valuation work by the Class I roads during the year ending June 30, 1921, making the total reported expended by these roads for the eight years approximately $54,000,000. The expenditure of the government Bureau of Valuation for the year 1921 was $2,728,656, while the total expenditure by the Bureau from the beginning of the valuation work has been approximately $21,500,000.

Four track men were killed and two enginemen injured on February 19 when a snowslide struck an engine near Loop, Colo., on the Denver & Salt Lake and swept it into a canyon 700 ft. deep. It is probable that neither the bodies nor the engine can be recovered before spring. When the snowslide occurred the section men were in the act of shoveling snow into the engine tank to replenish the water supply and the escape of the engineer and fireman without other than slight injuries is attributed to the fact that they were inside the tank distributing the snow.

A new thawing shed has just been put in service at the Pennsylvania Railroad's coal terminal at South Amboy, N. J., where coal for New York City and the Atlantic seaboard is delivered to boats. This shed is 448 ft. long, contains two tracks and accommodates 20 cars at one time. When the cars are placed inside of the shed and the door is locked, air is forced by powerful blowers over steam radiators and heated to between 200 and 250 deg., after which it is forced through concrete ducts having outlets underneath the cars at intervals of about six feet. The thawing takes from 1 to 12 hours, the average time being about three hours.

Within the last two months the Interstate Commerce Commission has been petitioned for authority to abandon 20 miles of line on the Bowlder-Elk Horn branch of the Northern Pacific in Montana; 12 miles of line on the Norfolk Southern extending from Pinehurst to Carthage, N. C.; 7½ miles of line on the Manistique & Lake Superior in Schoolcraft county, Mich.; about 100 miles of line at various points on the Memphis, Dallas & Gulf; and has authorized the abandonment of 17 miles of line on the Great Northern extending from Northport, Wash., and about 8 miles of line on the Baltimore & Ohio in Stark county, Ohio.

Personal Mention

General

J. G. Sullivan, consulting engineer, Winnipeg, Man., formerly chief engineer of the Canadian Pacific, Western Lines, was elected president of the Engineering Institute of Canada at its annual meeting in Montreal, Que., January 24 and 25. Mr. Sullivan was president of the American Railway Engineering Association 1917-1918.

Albert A. Hesser, an engineer by education, and formerly assistant real estate and tax agent of the Central of New Jersey, has been appointed manager of the marine department, effective February 1. Mr. Hesser was born at Mahanoy Plane, Pa., on July 8, 1886, was graduated from Lehigh University in 1911 with a degree in civil engineering and in 1915 completed a course of study in law at the Brooklyn (N. Y.) Law School. Mr. Hesser entered the engineering department of the Central of New Jersey in 1912, was transferred to the freight department in 1916 and later in the same year became an industrial engineer in the real estate and tax department. In 1920 he was appointed assistant real estate and tax agent, the position he was holding at the time of his recent appointment.

Charles H. Stein, formerly engineer maintenance of way and more recently assistant to the president and general manager of the Central Railroad of New Jersey, was appointed general manager with headquarters at New York, effective February 1. He will have charge not only of the operating department but of the engineering, mechanical and marine departments as well. Mr. Stein was born at Baltimore, Md., in 1871 and was educated in the Baltimore City College. He began his railroad career on December 7, 1889, as a rodman on the Western Maryland, and from that time until 1893 was transitman and assistant engineer on preliminary surveys and construction. From 1893 until May, 1903, he was assistant roadmaster on the same road and from then until June, 1905, was assistant supervisor of the Philadelphia & Reading with headquarters at Reading, Pa. In 1905 he was promoted to supervisor. Two years later he entered the service of the Central Railroad of New Jersey as engineer maintenance of way, and held that position until appointed superintendent in February, 1914. In 1918 he became assistant general manager of that road and of the Philadelphia & Reading. On March 1, 1920, he became assistant to the president of the Central of New Jersey, which position he was holding at the time of his recent appointment as general manager. The position of assistant to the president has been abolished.

C. H. Stein

Engineering

F. M. Hawthorne, assistant division engineer of the Logansport division of the Southwestern Region of the Pennsylvania, with headquarters at Logansport, Ind., has been promoted to division engineer of the St. Louis division, with headquarters at Terre Haute, Ind., succeeding **T. C. Herbert,** promoted.

P. T. Robinson, whose promotion to division engineer on the Southern Pacific, with headquarters at Oakland Pier, Cal., was noted in the February issue, was born at Hubbard, Iowa, on February 12, 1882. Mr. Robinson received his education at Rose Polytechnic Institute and entered railway service with the Union Pacific in 1900 as a rodman, later serving as instrumentman and assistant engineer. From 1907 until 1908, he served as assistant engineer on the Oregon Railroad & Navigation Company, and in the latter year entered the employ of the Southern Pacific as office engineer at Sacramento, Cal. He was appointed roadmaster at Sacramento in 1912 and the following year was promoted to assistant division engineer at Stockton, Cal., later serving in the same capacity at Los Angeles, Cal. Mr. Robinson was promoted to division engineer at Bakersfield, Cal., in 1918 and from 1919 to 1922 served as assistant division engineer at Oakland Pier, which position he held at the time of his recent promotion.

De Witt C. Fenstermaker, whose appointment as principal assistant engineer of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago, was announced in the February issue, was born on December 27, 1873, at Basil, Ohio. He entered railroad service in 1893 as a rodman on the Toledo & Ohio Central, and was later successively promoted to instrumentman, draftsman, and assistant engineer, which latter position he held until 1898, when he entered the army for service in the Spanish-American war. From 1899 to 1902 he was assistant engineer in the engineering department of the government of Cuba. Upon returning to this country he entered the service of the Lake Erie, Alliance & Wheeling as resident engineer. He left in 1903 to become resident engineer of the Louisiana Railway & Navigation Company and was soon thereafter promoted to division engineer, and later to chief engineer, with headquarters at Shreveport, La. From 1908 until 1910 he was city engineer of Tulsa, Okla., and from the latter date until 1912, he was designing engineer of the Lehigh & New England. He left in 1912 to become assistant engineer of the Chicago, Milwaukee & St. Paul, with headquarters at Chicago. He was promoted to district engineer, with the same headquarters in March, 1919, and, in April, 1921, he was granted a leave of absence in order that he might act as chief engineer for Peterson, Shirley & Gunther, Omaha contractors, in charge of the construction of 50 miles of railroad in Eastern Cuba for the Atlantic Fruit Company on which work he was engaged up to the time of his recent appointment.

F. J. Nevins, chief accountant in the valuation department of the Chicago, Rock Island & Pacific, has been appointed valuation engineer, with headquarters at Chicago. Mr. Nevins was born near Baxter Springs, Kan., in 1872, and entered railroad service in 1892, as a clerk in the local freight office of the Missouri, Kansas & Texas at Denison, Tex. He left that road in 1893, to enter the service of the Missouri Pacific as a freight brakeman at Osawatomie, Kas., where he was successively conductor, yardmaster and chief clerk to the general foreman of bridges and buildings until 1904, when he was promoted to chief maintenance of way accountant for the entire system with headquarters at St. Louis, Mo. One year later he was made chief clerk to the chief engineer of maintenance of way, which position he held until 1910, when he left railroad service to become sales and traffic manager of the Portland Cement Company, with jurisdiction over the Southwestern states, and with headquarters at Dallas, Tex. He re-entered railroad service in 1911 as assistant to the vice-president and general manager of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., which position he held until 1914, when he entered the service of the Chicago, Rock Island & Pacific as chief clerk to

F. J. Nevins

the engineer in charge of track elevation work at Chicago. He was promoted to chief accountant in the valuation department in 1916, with the same headquarters, which position he held up to the time of his recent promotion.

E. L. Martin, engineer maintenance of way of the Missouri, Kansas & Texas of Texas, with headquarters at Dallas, Tex., has been appointed engineer maintenance of way of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., succeeding H. H. Johntz, who has been assigned to other duties. **W. W. Marshall,** district engineer, Texas lines, with headquarters at Waco, Tex., has been appointed district engineer in charge of the newly created South Texas district, with the same headquarters.

Track

R. W. Thompson, whose promotion to supervisor of track on the Southern, with headquarters at Birmingham, Ala., is noted elsewhere in these columns, was born in Georgia February 13, 1886, and entered railway service as a track laborer on the Southern in July, 1905. On April 4, 1909, he was promoted to section foreman, which position he held at the time of his recent promotion.

L. B. Hancock, section foreman on the Southern, has been promoted to track supervisor, with headquarters at Chattanooga, Tenn. **R. W. Thompson,** section foreman, has been promoted to track supervisor of the Birmingham division, with headquarters at Birmingham, Ala. **P. H. Wadkins,** section foreman, has been promoted to acting track supervisor, with headquarters at Sheffield, Ala., succeeding **William Spurgeon,** who has been promoted to acting roadmaster of the Memphis division, with headquarters at Sheffield, Ala., in place of **George Jenkins** on leave of absence due to ill health.

A. D. Schader, whose promotion to roadmaster on the River division of the Chicago, Milwaukee & St. Paul, with headquarters at Wabasha, Minn., was noted in the February issue, was born at Norman, Okla., on July 10, 1897. He entered railway service in 1916 with the Kansas City Terminal Railway as an assistant construction foreman, later serving as steam shovel pit foreman. During 1918 Mr. Schader was successively employed on the Chicago, Burlington & Quincy at Kansas City, Mo., as work train foreman, timekeeper and acting roadmaster and in the spring of 1919 left the Burlington to enter the employ of the Missouri Pacific. In August of the same year he became yard foreman at the Mason City yard of the Chicago, Milwaukee & St. Paul, later serving as extra gang foreman. On April 18, 1921, he was promoted to assistant roadmaster, which position he held at the time of his recent promotion.

L. B. Hancock, whose promotion to supervisor of track on the Southern, with headquarters at Chattanooga, Tenn., is noted elsewhere in these columns, was born at Toomsuba, Miss., on April 1, 1866, and entered railway service with the Mobile & Ohio in 1891 as a section laborer. From 1892 to 1895, Mr. Hancock was employed on the Louisville & Nashville as section and extra gang foreman and in the latter year became section foreman on the Yazoo & Mississippi Valley, which position he held until 1900 when he left this road to go with the Hocking Valley as an extra gang foreman. During 1912, he served as an extra gang foreman for the government in Panama and in 1913 became roadmaster on the Alabama, Tennessee & Northern, which position he held until 1917 when he was appointed extra gang foreman on the Southern, the position he held at the time of his recent promotion.

Purchases and Stores

E. H. Gaines Jr., has been appointed purchasing agent of the Tennessee Central, with headquarters at Nashville, Tenn.

E. R. Brinton has been appointed general storekeeper of the Chesapeake & Ohio of Indiana, and of the Cincinnati division of the Chesapeake & Ohio, with headquarters at Covington, Ky. **J. P. Kavanaugh** has been appointed general storekeeper of the Eastern division of the Chesapeake & Ohio, with headquarters at Clifton Forge, Va. The position of inspector of stores has been abolished.

G. W. Bichlmeir, whose appointment as general purchasing agent of the Union Pacific, with headquarters at Omaha, Neb., was announced in the February issue, was born at Cincinnati, Ohio, on September 10, 1886, and entered railroad service in 1906 as a clerk in the office of the purchasing agent of the Cincinnati, Hamilton & Dayton (Baltimore & Ohio), after which he was successively clerk in the supply department of the Missouri Pacific, chief clerk to the division storekeeper at Osawatomie, Kan., chief clerk to the general storekeeper of the Kansas City Southern, chief clerk to the purchasing agent, assistant to the purchasing agent, Kansas City Southern, and subsequently purchasing agent of the same road. He became purchasing assistant of the Union Pacific, with headquarters at Omaha, Neb., in 1920, which position he was holding at the time of his recent promotion.

Obituary

Paul Paulson, assistant roadmaster on the Denver & Salt Lake, with headquarters at Tabernash, Colo., was killed on February 19 when a landslide swept the locomotive on which he was riding from the tracks into a canyon 700 ft. deep.

A. T. Hardin, vice-president operation, New York Central Lines, and former engineer maintenance of way, died in New York City February 21. Mr. Hardin was born 1868 and entered railway service in 1882 as telegraph operator on the Richmond & Danville Railway, where he remained until 1890 as agent and stenographer when he entered the University of South Carolina to pursue a course of study in civil engineering. Completing his course in 1894, Mr. Hardin entered the maintenance of way department of the Southern, where he remained until his appointment in 1898 to supervisor of the Eastern division, New York Central & Hudson River. From December, 1899, until February, 1903, he was engineer of track on the same road and on the latter date was promoted to engineer maintenance of way, which position he held until July, 1905, when he became assistant to the general manager. From June, 1906, to April, 1912, he was assistant general manager and for a year thereafter assistant vice-president, when he was promoted to vice-president, New York Central & Hudson River, in charge of operation, maintenance and construction. In June, 1915, he was made vice-president of the New York Central (Consolidated) and in June, 1918, became assistant regional director, Eastern region, United States Railroad Administration. He was made regional director of the same region in June, 1919, and served in this capacity until the end of federal control in March, 1920, when he resumed the office of vice-president, the position he held at the time of his death.

A. T. Hardin

W. G. Bayley, at one time engineer on maintenance of way on the Cleveland, Cincinnati, Chicago & St. Louis and until recently, superintendent of the Cincinnati-Sandusky division of that road, with headquarters at Springfield, Ohio, died at his home in Urbana, Ohio, on February 13. Mr. Bayley was born on September 2, 1865, at Hollidaysburg, Pa., and entered railway service in 1884, as a rodman on the Pennsylvania, leaving in 1885 to become a car record clerk on the Pittsburgh, Cincinnati, Chicago & St. Louis (Pennsylvania). From 1885 to 1890, he was again rodman on the same road, and from 1890 to 1891, was employed first in the maintenance of way department of the Louisville, New Albany & Chicago, and later in the same department on the Lake Erie & Western. He entered the service of the Cleveland, Cincinnati, Chicago & St. Louis in 1891 as division engineer on main-

tenance of way, and in 1894, he was promoted to superintendent of the Cairo division, with headquarters at Mt. Carmel, Ill. He was transferred to the St. Louis division, with headquarters at Mattoon, Ill., on December 1, 1896, and to the Cincinnati-Sandusky division, with headquarters at Springfield on August 1, 1899, which latter position he was holding at the time of his death.

William F. Merrill, formerly a vice-president and at one time a resident engineer on the Erie, died at his home in Plainfield, N. J., on February 3. Mr. Merrill was born on July 14, 1842, at Montague, Mass., and was educated at Amherst and Harvard Universities. In 1866 he entered railway service in the engineering department of the Chicago, Burlington & Quincy. From 1873 to 1875 he was resident engineer of the Erie at Buffalo, N. Y. For a period of five years following 1875 he was with the Toledo, Peoria & Warsaw (now the Toledo, Peoria & Western), consecutively as assistant engineer, assistant to the receiver and superintendent. From 1880 to 1882 he was general superintendent of the Wabash, and in the following year was general superintendent of the Chicago & Alton. From 1883 to 1887 he was superintendent of the Iowa lines of the Chicago, Burlington & Quincy, and thereafter became general manager of the Hannibal & St. Joseph and the Kansas City, St. Joseph & Council Bluffs (both now a part of the Chicago, Burlington & Quincy), In 1890, he entered the service of the Chicago, Burlington & Quincy in a similar capacity and remained in that position until 1896 when he was elected second vice-president of the Erie. In 1900 he became first vice-president of the New York, New Haven & Hartford and in 1903 retired from railroad service.

Employees of the Southern Pacific, beginning in February, were given the opportunity to buy shares of capital stock of the company at the market rate without the payment of commission. The plan provides that upon application of the employee the company will buy the stock in the open market, deducting the purchase cost from his monthly pay at the rate of $5 a month per share, the maximum number of shares which any employee may obtain on this basis at one time being 15. The company will charge the employee six per cent interest on the cost of the stock bought for his account and will credit him with dividends paid on the stock held for him.

Pursuant to a petition filed by the Bacon Brothers Company, Toledo, Ohio, in the federal court of that city, February 16, requesting the appointment of a receiver for the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, an order has been issued upon the Brotherhood to show why such a receiver should not be appointed. Aside from requesting the appointment of a receiver, the petition further requests that the receiver take possession of all property of the brotherhood within the jurisdiction of that court, including the funds on deposit with the Brotherhood of Locomotive Engineers' Co-operative Bank in Cleveland. The application is an amendment to the original bill filed several months ago by the company in which the union was sued for breach of contract to the amount of several thousand dollars damage.

The management of the Fort Smith & Western, a 200-mile railroad in Oklahoma, has issued a circular announcing to employees that cash prizes are to be offered for ideas and suggestions which can be used to enlarge upon the efficiency of operation of the road. This circular says in part: "Any old fashioned plant can continue to make money when business is flourishing, but in these times the most expensive modern equipment will not save any enterprise which ignores the importance of the human element and the elimination of unnecessary cost. Your employer must be able to make ends meet in order to pay your wages and meet other obligations. Conditions make it necessary that economy be practiced in its utmost detail." To this end the management suggests that every employee from the "highest official down to the office boy" submit whatever useful ideas he may have concerning the operation of the road. The employees are not limited to any department in their observations and are made their own judge of what ideas they should submit.

Construction News

The American Railway Express is constructing a new brick and concrete depot and office building at Sweetwater, Tex.

The Atchison, Topeka & Santa Fe contemplates the construction of 75 miles of second track and the reduction of grades between Yampai, Ariz., and Griffith. This company has awarded a contract to Scott & White, St. Louis, for the construction of a branch line from Satanta, Kan., to a point 55 miles westward, the cost of which is estimated at $1,400,000. The construction will be started in the near future. This company is constructing an additional jetty in Red Deer Creek, in order to protect its roundhouse and other terminal property at Canadian, Tex., from floods. This company will construct an extension to its lines from Owen, Okla., to Pawhuska, a distance of approximately 40 miles. The same company will construct four small store department buildings for storage purposes at Topeka, Kan., estimated to cost $15,000. The same company will construct a new bridge over Stranger Creek, a short distance northwest of Potter, Kan., replacing its last wooden span bridge on the entire system. A one-story brick section house will be constructed at Strong City, Kan., Cherryvale, and Ottawa Junction, estimated to cost approximately $7,500 each.

The Canadian Pacific will construct a large pier on the Burrard Inlet waterfront at Burrard (Vancouver) B. C., the dredging and filling for which was done in 1921. It is expected that the pier will be completed in 18 months. This company will construct an additional ice storage building at Okanagan Landing, B. C.

The Chicago, Burlington & Quincy noted in the February issue as receiving bids for the construction of a 45-room hotel and alterations to its eating house at Cody, Wyoming, estimated to cost $25,000, has awarded the contract for this work to F. Jacoby, Billings, Montana. This company, noted in the February issue as applying to the Illinois Commerce Commission for authority to build a new passenger depot at Aurora, Ill., has obtained such authority and will soon receive bids for its construction. A temporary frame station will be constructed at that point by company forces.

The Chicago Great Western is calling for bids for the construction of a two-story office building at St. Paul, Minn.

The Chicago, Rock Island & Pacific has awarded a contract to the Railway Water & Coal Handling Company, Chicago, for the construction of a steel coal chute at Bridgeport, Tex., estimated to cost $30,000. The same company contemplates the construction of a two-story brick freight house at Omaha, Neb., estimated to cost $20,000, and a one-story brick passenger depot at Graham, Tex., estimated to cost $25,000.

The Chicago Union Station has awarded a contract to R. C. Wieboldt, Chicago, for the construction of a temporary frame passenger station at Canal and Jackson streets, in that city, estimated to cost approximately $12,000. This structure will be used for the suburban service of the Chicago, Burlington & Quincy during the construction of the main passenger building. This company will soon request bids for the construction of a power plant at Harrison and Canal streets, Chicago.

The Cleveland, Cincinnati, Chicago & St. Louis has prepared plans for the construction of a Y. M. C. A. building at Bellefontaine, Ohio, estimated to cost $100,000. This company will construct a second main track from Farmland, Ind., to a point about two miles east of Muncie, a distance of approximately 12 miles.

The Denver & Rio Grande Western contemplates changing its lines in New Mexico from narrow gauge to standard gauge with the possibility of also extending them. No definite decision has yet been reached as to when this work will be undertaken.

The Elgin, Joliet & Eastern in conjunction with Chicago & Joliet Electric, and the state highway department of Illi-

nois contemplates the construction of a viaduct over the tracks at East Cass street, Joliet, Ill.

The Erie has awarded a contract to Foley Brothers, St. Paul, Minn., for the construction of a freight pier 100x842 ft. at Weehawken, N. J. The pier dock walls and platform will be of concrete construction with a superstructure of wood sheathed with zinc.

The Great Northern noted in the January issue as contemplating the construction of a second main track between Lamona, Wash., and Blustem, a distance of 22 miles, has awarded the contract for this work to Grant Smith & Co., Seattle, Wash. This company also contemplates the construction of a second main track between Williston, N. D., and Spring Brook, a distance of about eight miles and contemplates the construction jointly with the Northern Pacific, of a viaduct over the tracks at its Bay Front yard, Superior, Wis., although the latter work has not yet been authorized. The same company is making extensive repairs to its Interstate Bridge in Superior, including the rebuilding of the Superior approach, which is used for street railway and highway traffic. This company contemplates the construction of a second main track between Surrey, N. D., and Minot, a distance of 7-3 miles, estimated to cost $140,000; between Dean, Wash., and Hillyard, a distance of 9 miles, estimated to cost $180,000; and between Spokane, Wash., and Fort Wright, a distance of 2.7 miles, estimated to cost $54,000.

The Illinois Central will construct a third track from Matteson, Ill., to North Junction, a distance of about 10 miles, and from Tucker to Kankakee, a distance of approximately 5 miles. This company will construct a freight and passenger depot at Baton Rouge, La. It is expected that bids will be called for within a month.

The Illinois Central closed bids February 23, for the installation of a pipe line to extend from the city water main, Centralia, Ill., to its yards in that city, a distance of about 3 miles.

The Illinois Central contemplates the construction of a freight and passenger depot at Clarksdale, Miss., estimated to cost $250,000, of which the city and commercial organizations will bear a proportional expense.

The International & Great Northern has been requested by the state railroad commission of Texas to rebuild its bridge over Greens Bayou, near Aldine, Tex.

The Kansas & Oklahoma Southern has been authorized by by the Interstate Commerce Commission to construct a line of railroad extending from Caney, Kan., to Vinita, Okla., a distance of 61 miles, and from Vinita, Okla., northwest for a distance of about 10 miles into the coal mining district.

The Los Angeles & Salt Lake will construct a new freight depot at Long Beach, Cal., and has applied to the railroad commission of that state for permission to construct standard gage trackage on certain city streets of that city in order to serve the proposed station.

The Louisiana Railway & Navigation, noted in the February issue as having preliminary plans prepared for the construction of a passenger depot at New Orleans, La., has petitioned the railroad commission of that state and the city council of New Orleans to extend its tracks and construct the station at Gerod and South Romfort streets.

The Minerets & Western noted in the February issue as receiving bids for the construction of a 35.5 mile standard guage railroad extending from Fresno, Cal., into timber lands, has awarded the contract for this work to the Warren Construction Company, San Francisco, Cal. The estimated cost of the construction is $800,000 exclusive of bridges.

The Minarets & Western has awarded a contract to Mercer-Fraser Company, Eureka, Cal., for the construction of a bridge over the San Joaquin river at Friant, Cal., the cost of which is estimated at $90,000. The structure will be 1300 ft. in length of which 400 ft. will be of steel construction and about 900 ft. of open deck wooden trestle.

The Minneapolis, St. Paul & Sault Ste Marie contemplates the construction of new terminal facilities at Park Falls, Wis. A roundhouse, repair and machine shops, car sheds and other necessary buildings will be constructed at that point at an estimated cost of $500,000.

The Missouri Pacific, noted in the January issue as accepting bids for a reinforced concrete and stucco passenger station at Earle, Ark., has awarded the contract for this work to H. O. Hirsch & Company, St. Louis, Mo. This work will cost approximately $23,000. This company will accept bids until February 20 for the construction of a one-story building at Winnfield, La., estimated to cost $10,000. This company has awarded the contract to J. D. Fitzgibbon, St. Louis, Mo., for the construction of a service building at Little Rock, Ark., estimated to cost $12,000.

The New Holland, Higginsport & Mt. Vernon has obtained authority from the Interstate Commerce Commission to construct a line extending from a connection with the Norfolk Southern at Wenona, to New Holland, N. C., a distance of 35 miles.

The New York Central is contemplating the construction of a steel highway bridge, 125 ft. in length, near Syracuse, N. Y., to carry the Newark-Lyons highway over its tracks, eliminating a grade crossing.

The New York, New Haven & Hartford, in applying to the Interstate Commerce Commission for a government loan, including $3,000,000 for additions and betterments, lists the following among other proposed expenditures for the coming year: Rail and other track material, $700,000; additional main tracks, $100,000; additional yard tracks and sidings, $500,000; signals and interlocking, $300,000; shop buildings, engine houses, etc., $150,000; electric power plants, etc., $600,000; improvements to freight cars, $150,000; and improvements to locomotives, $100,000.

The Oregon Short Line has been petitioned by the farmers in southwestern Idaho, to extend its Homedale branch from Homedale, Idaho, to Butte, a distance of about 7 miles.

The Pacific Fruit Express contemplates the construction of an ice plant at a location which has not as yet been announced.

The Pere Marquette is preparing plans for the construction of new shops at Wyoming, Mich., estimated to cost $1,400,000. This same company will construct a swing bridge over the Saginaw river at Saginaw, Mich., and a bascule bridge over the Black river at Port Huron, Mich., estimated to cost $700,000. The cost and construction of the above projects will be spread over a period of two years. One hundred sixty miles of road-bed will be laid between Baldwin, Mich., and Ludington; Holly, Mich., and Wixom; Detroit, Mich., and Plymouth; and Sarina. Ont., and Chatham. The Flint Belt line which was started last year will be completed as soon as possible at the total cost of $650,000.

The Railway Ice Company is constructing a one-story brick icing station, 275 ft. by 100 ft., at Clearing, Ill., at an estimated cost of $350,000. It will be operated by the above company for the Belt Railway of Chicago.

The Salt Lake & Utah in conjunction with the Bamberger Electric, contemplates the construction of a two-story reinforced concrete and steel terminal building, 170 ft. by 184 ft., including stores, offices and train sheds, at Salt Lake City, Utah, the entire cost of which is estimated at $250,000.

The Salt Lake & Utah has been authorized by the Public Utilities Commission of Utah to construct an extension to its line from Springville, Utah, into the Uintah basin, the work to be completed within two years.

The St. Louis-San Francisco will spend $1,691,000 during the entire year for track extensions and the replacement of old rails, which work will include the laying of 186 miles of new track of 90 pound rail. A second main track will be constructed between Spring Hill, Kan., and Paola, a distance of about 13 miles, and between Windsor Springs, Mo., and Valley Park, a distance of approximately 5 miles. A sum of $673,000 will be spent no grade revision work between Crocker, Mo., Garnev and St. John; $328,000 for rock blasting between St. Louis, Mo., and Memphis, Tenn., and between Okmulgee, Okla., and Muskogee; $280,000 for new power plants; and $25,000 for the installation of water treating plants. This same company will again receive bids until March 1, for the remodeling of its Harvey eating house at Sapulpa, Okla., the work of which is estimated to cost approximately $65,000.

The San Antonio & Aransas Pass has under consideration improvements and betterments to its property at Waco, Tex., estimated to cost between $30,000 and $40,000. No definite decision has been made, however, as to when the work will be undertaken.

The Tennessee Eastman Corporation contemplates the construction of a line from Kingsport, Tenn., into Hawkins County, a distance of about 20 miles. Surveys have been made but no final decision has been made as to the undertaking of the work.

The Trinity & Brazos Valley will reconstruct a depot at Donie, Tex., and one at Coolidge, both of which were recently destroyed by fire.

The Union Pacific closed bids on February 10 for the construction of a new station and rooming house at Yermo, Cal.

The Wichita & North Western has been denied a certificate authorizing the construction of an extension of 14 miles from a point near Vaughan to La Crosse, Kan., by the Interstate Commerce Commission which says that it is unable to find that present or future convenience and necessity require the construction of the extension.

Equipment and Supplies

The Baltimore & Ohio has ordered fabricated steel for a bridge from Mt. Vernon Bridge Company and for another bridge from the Fort Pit Bridge Company. Both structures call for a total of about 550 tons.

The Bangor & Aroostook recently placed an order with the Bethlehem Steel Company for 2,000 tons of 80-lb., open hearth steel rails, with angle bars to fit.

The Chesapeake & Ohio is inquiring for 21,000 tons of rail, including 3,000 tons for the Hocking Valley.

The Cleveland, Cincinnati, Chicago & St. Louis is inquiring for low switch stands, split derails, guard rails, rigid spring and solid manganese frogs, switches and switch points, bids for which are to be submitted to W. J. Hiner, Cincinnati, Ohio, before March 6.

The Chicago Union Mail Terminal has ordered 370 tons of conveyor and structural steel supports from the Pittsburgh Bridge & Iron Company.

The Delaware, Lackawanna & Western is asking for prices on 500 tons of fabricated steel for various bridges on its line.

The Great Northern is calling for prices on 450,000 tie plates.

The Harbor Department of Los Angeles, Cal., will open bids on March 3, for miscellaneous supplies including 30 frogs, 30 switches, 30 stands and other track material.
at 327 S. La Salle street. He was born at Pittsburgh, Pa., on

The Illinois Central has ordered 30,000 tons of 90-lb. rail, distributed as follows: 14,000 tons from the Tennessee Coal & Iron Company, 11,000 tons from the Illinois Steel Company, and 5,000 tons from the Inland Steel Company.

The Japanese Government Railways closed bids February 13, for 10,000 tons of 60-lb. rail, together with 500 tons of splice bars.

The Lehigh & New England is inquiring for 400 tons of fabricated steel for seven bridges on its lines.

The Louisville & Nashville has ordered 2,700 tons of splice bars from the Inland Steel Company; 7,500 kegs of spikes from the Jones & Laughlin Steel Company; and 3,500 kegs of bolts from the Illinois Steel Company.

The Minneapolis & St. Louis has ordered 3,000 tons of rails from the Illinois Steel Company.

The New York Central will receive bids until March 3, for 23,000 tons of fabricated steel, for the proposed bridge over the Hudson river at Castleton, N. Y.

The New York Central closed bids February 24, covering the manufacture and delivery of the structural steel for the proposed bridge of the Hudson River Connecting Railroad over the Hudson river, south of Castleton, New York.

The Southern Railway has ordered 9,000 tons of rails from the Tennessee Coal, Iron & Railroad Co.

Supply Trade News

General

The Rathbun Jones Engineering Company, Toledo, Ohio, has appointed the Ingersoll-Rand Company, New York City, general sales agent for Rathbun gas engines.

The Eymon Crossing Company, Marion, Ohio, has opened an eastern office in Boston in charge of **G. T. Wiswell,** formerly with the New York, New Haven & Hartford.

The Wood Shovel & Tool Company, Piqua, Ohio, has appointed the **Maintenance Equipment Company,** Chicago, its agent to handle the distribution of its shovels to the railroads.

The Barnes Railway Rail Brace Company has been organized at Willis, Tex., by M. E. Barnes of that city; Mack Hannah of Port Arthur, Tex., and C. H. Long, San Antonio, Tex.

The Pittsburgh Testing Laboratory, Pittsburgh, Pa., inspecting engineers and chemists, announces the retirement of its president, **George H. Clapp,** and his reappointment as a member of the board of directors of the company, and the election of **Col. James Milliken** to the presidency of the company. Col. Milliken was born on February 19, 1865, at Newton, Bucks County, Pa., and is a graduate in mechanical engineering of the University of Pennsylvania. In September, 1885, he entered the service of the Pennsylvania Railroad, was made superintendent of motive power of the Philadelphia, Baltimore & Washington in 1903 and in May, 1917, joined the 19th Engineers as assistant to Col. Deakyne. The following July he was appointed mechanical aid to S. M. Felton, director general military railways at Washington, D. C., and was given charge of the design, purchase, production and shipment of locomotives, cars, shop and engine house equipment. In June, 1918, he was placed in charge of the engineering and purchasing work of the railway equipment and track materials, and on October 18, 1918, was commissioned a colonel in the Corps of Engineers.

Personal

George W. Bender, formerly associated with Mudge & Co., Chicago, has been appointed vice-president of the Argyle Railway Supply Company, Chicago, which has opened offices at 327 S. LaSalle street. He was born at Pittsburgh, Pa., on August 20, 1884. Seventeen years later he entered the engineering department of the Pressed Steel Car Company at Pittsburgh. In 1906, he entered the service of the American Locomotive Company, where he had charge of the extra work order department. He became associated with Mudge & Co., in 1910, as chief draftsman, and subsequently was placed in charge of the mechanical department. Later he was promoted to assistant to the vice-president and in April, 1918, was appointed eastern manager in the

George W. Bender

he was appointed manager of sales and service, with headquarters at Chicago, the position he occupied at the time of entering the service of the Argyle Railway Supply Company.

J. T. McGarry, vice-president of the American Valve and Meter Company, Cincinnati, Ohio, has been elected president and general manager, succeeding **Wallace H. Gray,** who has been elected chairman of the board of directors. **C. F. Bas-**

tian has been elected secretary and treasurer of the same company, succeeding Dwight Marfield, resigned.

C. L. Dewey, formerly associated with the Dewey Cement-Gun Company, and the Traylor-Dewey Contracting Company of Allentown, Pa., is now with the Cement-Gun Construction Company, Chicago, with which company he will devote his time to the development of cement-gun contract work.

A. R. Hance has been appointed northwestern sales manager of the Bucyrus Company, South Milwaukee, Wis., with headquarters at 608 Pittock Block, Portland, Ore., succeeding **L. T. Russell,** who has resigned. Mr. Hance has been connected with the sales department of the company in the Central and Eastern territorities for the past six years.

William C. Sargent, for many years secretary and also a director of the Chain Belt Company, Milwaukee, Wis., died on February 5. Mr. Sargent was born at Troy, N. Y., on February 2, 1849. In 1871 he went to St. Paul, Minn., and in 1900 became secretary and later a director of the Chain Belt Company, Milwaukee. He was also a director of the Federal Malleable Company, West Allis, Wis.

Joseph E. Schwab, who was president of the American Steel Foundries Company from 1902 to 1904, at New York, died at his home in New York City, on February 17, at the age of 57. He was born at Loretto, Pa., and joined the Carnegie Company two years after his brother, Charles M., became identified with it, and since that time they were closely associated in various business enterprises. Joseph Schwab served as an engineer in the Carnegie Company until 1894, when he became manager of its Duquesne works. When the United States Steel Corporation was formed, he left the Carnegie Company to become assistant to his brother, the president of the corporation. Two years later he became president of the American Steel Foundries Company and, after a few years, he retired from active participation in industrial properties.

Frank Solyman Dinsmore, for many years a member of the business department staff of the Simmons-Boardman Publishing Co., died at the Long Island College Hospital, Brooklyn, N. Y., at 1:30 a. m., on February 14, of chronic interstitial nephritis.

The end came sooner than was expected. On January 4, following advice of his doctor, Mr. Dinsmore sailed for the British West Indies in the hope that the warm climate would help nature, and that his life might thus be prolonged. But it was too late. By the time the steamer reached Barbadoes Mr. Dinsmore was too weak to disembark; so he came back, was taken to the hospital and there the spark of life gradually dimmed and then went out. With characteristic optimism, he scarcely realized the seriousness of his condition; and he passed away unconscious of the end and without pain.

Frank S. Dinsmore

Funeral services were held in Brooklyn, where he had lived, on the morning of February 16, after which the body was taken to Chicago, where a second service was held at Rosehill Cemetery, Chicago, February 18, prior to the cremation of the body.

Mr. Dinsmore is survived by a brother, a sister, a half-brother and a half-sister.

"F. S. D.," as he liked to be called and which he frequently applied to himself when reminiscing, was born at Berlin, Wis., May 13, 1859. His father, a pioneer, treked by wagon from his birthplace in New Hampshire to northern New York, where he married before going West. At the age of 12, Frank, disgusted by his inability to convince his teacher that he was right in an argument when he was sure of the position he had taken, threw aside his books and went to work for his father, a maker of farm implements. In 1881 he made up his mind to study medicine; and for the next 16 years he so applied himself when not selling medical books to get money with which to pay his tuition fees. Thinking that his ambition to become a surgeon would be advanced thereby, he joined the staff of the Railway Surgeon in 1894, that paper being then published by the owner of the Railway Age. Three years later he transferred his affections to the latter publication and came to New York as its eastern representative. From that time to bis death he was almost literally wedded to the Railway Age and its sister publications; because for it he lived and, in a sense, died—for he might have been spared longer had his devotion to his work not caused him to regard with contempt, until too late, the warnings he heard on every hand and of which he himself must have been convinced.

In trying to visualize another's character, it is not always easy to know just where to start. With Frank Dinsmore, he was, first of all, a philosopher, with characteristic calmness of temper and judgment and practical wisdom; to which should be added a natural love for his fellow man, gentleness, uprightness and loyalty.

Looking back over the last 24 years and applying to him those splendid attributes which were his, it is not hard to understand how, in the early days of the Railway Age, Frank Dinsmore, with his philosophical mind, an abiding faith in his mission and tireless devotion to duty, saved the day over and over again when the till was empty and the liabilities far exceeded the assets. At that time he might have advanced further along the road to material prosperity had he so willed; but instead he elected to stay in the niche he himself had selected, that his conscience might not be charged with lack of devotion to the man who had given him his job (the late Hugh M. Wilson) and to whom he had pledged his all.

Mr. Dinsmore's principal work was that of an advertising salesman; and therein lay the tangible measure of his precuniary worth to this institution. But his employer values most what he did, by living example and fatherly advice, to help and encourage the younger men of the entire staff—business and editorial. When discouraged, he lifted them out of their depths; if he saw their jobs in jeopardy, he diplomatically and unobtrusively tried to awaken the sort of interest and ambition which would overcome the failing; and when they required a guiding hand, it was his that was always outstretched.

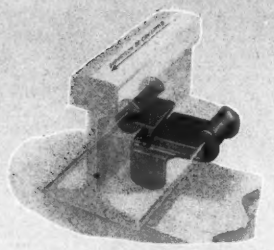
And with his tribute to Mr. Dinsmore's immeasurable worth his employer of the last 14 years unstintingly links his own sense of obligation for the unswerving loyalty and devotion that was reflected in so many varied and delightful ways. With employer and co-worker alike, Mr. Dinsmore's death has created a vacancy that is real. Everyone who was intimately acquainted with him will have as his most lasting expression the beautiful example his living afforded.

E. A. S.

Trade Publications

Engine Coalers.—The Roberts & Schaefer Company, Chicago, has prepared a four-page bulletin illustrating and describing locomotive coaling equipment, involving the use of incline elevators both with and without the elevated storage. Particular attention is drawn to equipment involving only the track hopper and the elevating bucket in which the coal car and the hopper are depended upon for the storage capacity.

Waterproofing.—"Science and Practice of Integral Waterproofing" is the title of a 33-page booklet published by the Truscon Laboratories, Detroit, Mich., concerning the integral methods of waterproofing concrete developed by the Truscon Laboratories. The booklet is divided in three sections, the first 15 pages being devoted to an interesting presentation of the theory of waterproofing, the next seven pages covering the specifications for waterproofing mass concrete and general masonry by cement plaster methods, as well as the method of waterproofing cement stucco, and the remainder of the book devoting attention to the practical application of the waterproof cement plaster coat.



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